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Variable Budgeting for Planning and Control

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Gathered together in this article around the core of an informed exposition of the preparatory methods for, and the derivation of benefits from, a variable budget for a manufacturing company are well-pointed-up recommendations as to effective means of profit planning, profit maintenance, including appraisals of operating performance and of probable future operating results.

IS YOUR COMPANY BOTHERED in times of businses retraction by profits that shrink faster than sales? Do you realize the unhappy truth only when your financial statement makes its monthly appearance, several weeks too late? Are you then forced into arbitrary payroll slashes to make both ends meet or to appease the stockholders?

Fortunately, there are measures which, when adopted in time, will not only reduce the acute effects of lower volume but will also help with the everyday planning of your business, and serve as a tool to permit more effective management with reduced effort. These steps include the following:

1. **Establishment of a profit goal.**
2. **Development of volume and price objectives.**
3. **Determination of cost objectives.**
4. **Control of expenses within the limits set by these objectives.**

Establishing the Profit Goal and the Subordinate Objectives

In the past, your company's profit objective may have been determined by historic patterns, or by the need for retained earnings in the business or by the sales department's idea of what prices the market will bear. But are profit amounts to cover these needs enough? Do you have an adequate profit objective?

To answer this question you must study the market in which the company sells and the cyclical pattern of that market. At a minimum, dividend and

retained earnings requirements should be met not just this year but over the average of the business cycle's swing. For this reason, the profit objective in a good year must be higher than in a poor year, to provide for the slimmer times ahead.

Even this consideration may not result in an adequate objective. You should measure your company against your best competitors. To do this, a standard of measurement is needed. One profit yardstick consistent with the interests of the stockholders is return on net worth. How does your profit goal compare with the return on stockholder investment offered by your competitors? Or, if yours is a low-yield industry, by outstanding concerns in allied fields? Why should you feel constrained to less? Your company's profit goal will be conditioned somewhat by the industry you are in, the product you make, and the plant and equipment on hand when your profit program is first established.

One advantage of developing and using a profit plan, is that future decisions concerning the addition of products or facilities, or the making of other expenditures, may be based on the effect of such moves upon return on net worth. If a new project does not measure up to the objective set with respect to return on net worth, it should be side-tracked in favor of one which does. If a number of projects are under consideration, analysis of each on this basis will aid materially in the proper selection.

The profit goal may be expressed in terms other than return on net worth. From the standpoint of a general manager of a decentralized division, return on total assets employed would be a more useful measure. Whether the asset is financed through net worth, bank loans, or accounts payable is of little concern to him. If his performance is to be measured against that of another manager, then return on the total assets entrusted to his care becomes the important consideration.

Once the profit goal is established, the most expeditious way of achieving it must be determined. This requires knowledge of your product's position in the market, its long-run sales expectancy, and the price at which that sales volume can be realized. Analysis should also be made of underlying trends affecting the future of your market, including such factors as population growth, national income, consumer buying habits, and the possibility of improving your market penetration. With such background information, you should be in a position to make logical long-range forecasts upon which your pricing policies and cost control programs will be based.

There are a number of ways to arrive at cost objectives. For the long run, perhaps the most simple is to subtract the profit objective from estimated sales. This, however, leaves all the unknows in the cost area. To have attainable cost

objectives, they must be built from the ground up. Then, if the elements of sales and cost do not yield the desired profit, attention can be directed towards any one of several solutions, with the knowledge that cost yardsticks are adequate for measuring short-term performance and that any performance failure will be flagged quickly.

Profit improvement projects could include cost reduction, product simplification, volume increase, new products, price adjustment, or even administrative changes as sweeping as decentralization or integration. By these or other measures, the company's over-all program may be aimed towards attainment of the profit objective.

Control of Expenditures — That's Where the Budget Comes In

Knowledge of the costs incurred in making your various products is essential to their control. The direct material cost for each product should be available from bills of material, while direct labor should be obtainable from labor bills or, in their absence, from historical records or time studies and estimates. Overhead poses a more difficult problem because of the effect on unit cost of varying volume. An inflexible overhead budget based on forecast volume is frequently invalidated by unexpected sales or by the more serious business downturn in the early months of the year. If such budgets are changed arbitrarily, performance cannot readily be compared from one period to another.

The best answer to such a predicament is the use of a variable budget. Although all expenses vary, some fluctuate directly with productive labor, while others remain relatively constant regardless of the productive labor level. Between these two extremes lies many expenses which vary but not in direct proportion to direct labor. Rearrangement is an example. To create a budget which will accurately authorize all such expenses is a difficult task.

Such a budget may be approximated, however, by making logical assumptions as to the portion of each expense account which varies directly with direct labor or other chosen measure of volume, and assuming that the balance is fixed. This determination should be made at a predetermined average volume level. Several automotive companies base their budgets on standard volume, which is defined as the average volume expected over the future period of about ten years. Although you may wish to select a shorter period, particularly if in a growing company, the longer periods have the advantage of eliminating the effects of cyclical variations from both budgeting and pricing.

All this sounds just fine, you say, but how do I create a variable budget? Just what is it anyway? And what good will it be once I have it?

A variable budget is one which segregates the fixed from the variable ex-

pense, under the assumption that the latter will vary directly with manufacturing volume as reflected by the productive labor level and that the "fixed" expense will remain constant within reasonable limits of volume fluctuation. Fixed expense, at least for our purposes here, is that expense or portion of an expense which will not change during the year under study *solely* due to changes in manufacturing volume.

Once the variable budget is established, it can be expressed in terms of fixed and variable authorization, separately, and repeated revisions become unnecessary. Performance reporting is facilitated, and the plant manager is relieved of the pressure of relatively uncontrollable fixed expense on the down-swing,

PREPARATION SHEET FOR MANUFACTURING EXPENSE BUDGET

Division_____ Year_____

Account *		10. Proposed budget Total	11. Proposed budget Fixed	12. Proposed budget Variable	13. Variable % to standard direct labor
Direct Labor					
Gross direct labor	The following are the headings of Columns 1 to 9 in the schedules as used:				
Transfers					
Net direct labor					
Standard direct labor	1. Year to date 2. Estimated full year				
Indirect Labor					
Gross indirect labor	3. Wage rates 4. Pensions				
Transfers	5. Indirect materials 6. Efficiency				
Net indirect labor	7. Volume 8. 9. Misc.				
Other Overhead					
Employee benefits					
Payroll taxes & insurance					
Operating supplies					
Tools					
Utilities					
Maintenance					
Losses and errors					
Fixed charges					
Depreciation					
Other expense					
Transfers					
Total other overhead					
Net manufacturing expense					

* Detail by sub-accounts

EXHIBIT 1

while at the same time restrained from over-spending during prosperous times. Further, performance against budget can be compared from one period to another.

Let us suppose that you are responsible for financial control in a multi-plant company which has never had a budget. How do you go about installing one?

Your first and most important task will be an educational one. Not only

must top supervision support the plan for budgetary control, but, more important, the supervisors and foremen in your plants, who spend the money, must understand the budget, aid in developing it, and accept it as a tool for their own use, rather than as a symbol of inquisition. I have seen budgets fail in a number of plants because they were the product of the accounting department alone. Plant supervision did not understand them, nor agree with their validity. Never having been consulted in connection with setting the budget for his operation, the manufacturing manager would have good reason for complaint if he were required to comply with expenditure limitations which would reduce his ability to get the product delivered on schedule. So the first step must be a selling effort. The general theories of budgeting, of controlling expense by high-lighting the out-of-line areas to permit management "by exception," should be explained to all supervisors down to the foreman level. The budget should be presented as a tool to help them improve performance.

And, after preparing the way, what better method of specific education could you use than to ask each departmental supervisor to participate in the development of his own budget, by submitting the first proposals for his department via the chain of command? The accounting department should develop the necessary forms and procedural instructions and assume the detailed accounting responsibilities. Operating men should not be burdened with accounting details and techniques. The requests to them for budget information must be simple and set forth in a limited number of categories. One approach is to issue a questionnaire to the various departments made up in terms of machine time, product units, or other recognizable measure of volume, requesting the necessary direct labor manpower, indirect manpower, supplies, tools, maintenance, and miscellaneous expense to support production at a number of volume levels. The accounting department can consolidate these and convert them to dollars, filling in fringe benefits, utilities, losses and fixed charges to support the work load evidenced by the basic requirements reported. The requirements reported by operating supervisors should also be closely scrutinized in light of experience, to assure realistic budgeted amounts.

It is also important to review the accounting distribution practices of each plant during this preparatory period, to make sure that items of expense are similarly classified and reported consistently, so that the performance of different plants can be compared.

Assembling the Data; Separating Fixed and Variable Expense

The manufacturing expense budget may be prepared in detail for a list of accounts like those in Exhibit 1 and should be built at the average sales vol-

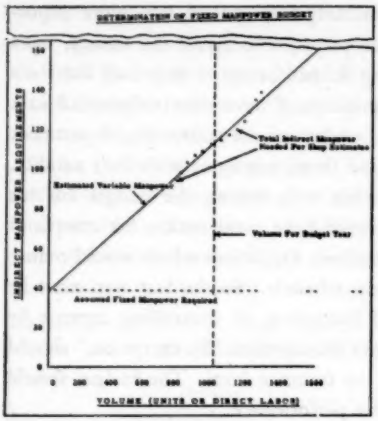
DETERMINATION OF FIXED MANPOWER BUDGET
INDIRECT MANPOWER REQUIREMENTS
Total Indirect Manpower Needed Per Shop Estimates
Estimated Variable Manpower
Volume Per Budget Year
Assumed Fixed Manpower Required
VOLUME (UNITS OR DIRECT LABOR)

EXHIBIT 2

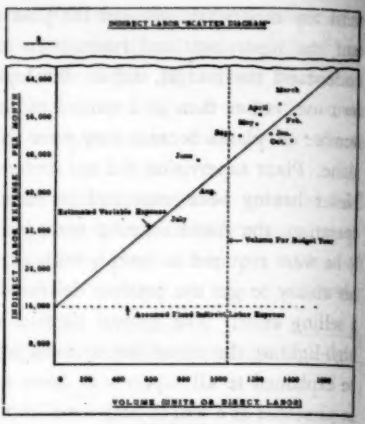

EXHIBIT 3

ume contemplated for the coming year. Actual expenses for the current year to date should be entered in the first column and the best present estimate for the full year in the second column. Any adjustments to the year-to-date expenditure level to bring the year's total in line with that expected next year should be included in Columns 3 through 9, in line with their headings or in blank columns if others are needed. Amounts shown in the adjustment columns should be fully explained. Labor rates and direct material prices should be included in the budget at the levels currently being experienced.

After entering total budget expense for next year in Column 10, that portion which will not vary if volume should increase or decrease over a significant range should be shown in Column 11. One method of determining fixed expense is to plot indirect manpower and material requirements furnished by shop supervision over a reasonable production volume range (for example, 35 per cent above to 35 per cent below the budgeted volume) on a graph of expense (or manpower) against budgeted volume (0 to 135 per cent), and fit a line through the reported requirements back to zero volume. This line should intersect the left side of the graph at approximately the fixed expense level included in the estimates, as shown by Exhibit 2. The fixed amount thus determined should not be greater than the lowest amount management would authorize to sustain production on a going concern basis. Another means of determining fixed expense is to plot the amount incurred for a particular account monthly over a period of time, with expense on one axis and an appropriate measure of production volume along the other axis. The "scatter diagram" which results should show whether there is any pattern of increasing or decreasing expense

with volume, and the line fitted to such a scatter diagram may be carried back to zero volume to determine fixed expense, as illustrated by Exhibit 3.

After arriving at the fixed content of each account, the variable amount may be determined by deducting the fixed portion from the total amount budgeted and entering the result in Column 12 of Exhibit 1. The variable ratio to standard direct labor for each account is then calculated by dividing Column 12 by the total amount of standard direct labor expected for the year, and entering the result in Column 13.

The manufacturing expense Budget by month is determined by adding one-twelfth of the fixed budget for the year to the variable budget for each month. The monthly variable budget is determined by multiplying the month's expected standard direct labor produced by the variable ratios from Column 13 of Exhibit 1. Amounts calculated in this way may be used in monthly expense forecasts. The budget figures used for performance reporting would be calculated in the same manner, using actual standard direct labor produced as a base.

The proposed budget should be reviewed carefully, and compared with current expenses and the present budget. Every effort should be made to improve the standard of performance each year. One technique is to establish new budgets at the best expense levels attained over reasonable periods in prior years, thus constantly increasing the task of meeting the objective. In the early years of a new budget program, this could be carried so far as to tighten each budgeted expense by an arbitrary five or ten per cent each year. In doing this, the budget for expenses not controllable by the plant manager should either be increased or decreased realistically, or be separately budgeted and reported.

Reporting Performance Against the Budget

After the budget has been accepted, a simplified reporting procedure must be adopted, which will permit preparation of trend charts for each account classification, or for those in which management is most interested. The zero line of such a chart might represent on-budget performance, with the ratio of actual expense each month over or under the budget then plotted above or below the budget line, as shown by Exhibit 4. Such a chart may also be used to show the trend of net direct labor versus standard direct labor at the beginning of the budget year as the base line, and also the trend of current labor standards as compared with the base line thus focusing attention on improvements in standards. An advantage of this presentation is its simplicity, and the ease with which a trend change can be spotted. Also, the manufacturing

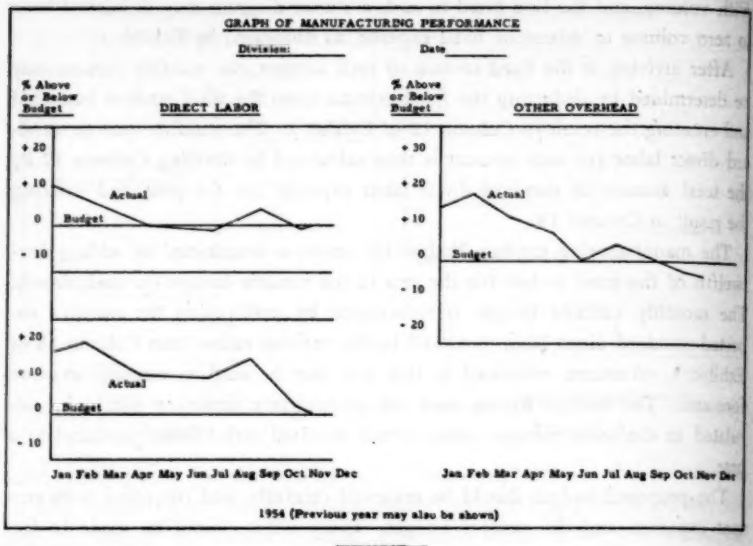

EXHIBIT 4

performance of each plant thus may be graphically presented on a single sheet of paper. A sample manufacturing expense reporting procedure useful in connection with the budget procedure outlined, and which will provide the data for such trend charts is outlined below, and may be embodied in a monthly Manufacturing Report as shown on Exhibit 5.

In preparing the monthly performance report, actual expenses for the month should be entered in Column 1 of the exhibited report form. One-twelfth of the annual fixed expense included in the manufacturing expense budget should be entered in Column 2. Although some elements of fixed expense will vary with the season, such as utilities and heat, it is assumed that these variances are relatively minor. So, for convenience, the same amount of fixed expense should be included in the budget each month. Actual variable expense, Column 3, is determined by subtracting budgeted fixed expense from total actual expense. Fixed expense will not change from month to month if properly accrued; therefore, any deviations in fixed expense are thrown into the actual variable column and excesses must be offset by actual variable reductions elsewhere. The variable budget, Column 4, is determined by multiplying the month's standard direct labor by the budgeted variable ratio to standard direct labor for the account, obtaining this figure from the annual manufacturing expense budget. The total budget is the sum of the fixed expense (Col-

MANUFACTURING PERFORMANCE REPORT*

Division_____

Month _____

	1	2	3	4	5	6	7
	Total actual	Fixed budget	Variable Actual	Variable Budget	Total Budget	Variance Amount	Variance %
Gross indirect labor							
Transfers							
Net indirect labor							
Employee benefits							
Payroll taxes and insurance							
Operating supplies							
Tools'							
Utilities							
Maintenance							
Losses and errors							
Fixed charges							
Depreciation							
Other expense							
Transfers							
Net manufacturing expense							
Net direct labor		XXX	XXX	XXX			
Std. direct labor		XXX	XXX	XXX			
% Net to Std. D. L.		XXX	XXX	XXX			

*Report in actual use also has figures for the year to date.

EXHIBIT 5

umn 2) and the monthly variable amount (Column 4). From this budget, total actual expense in Column 1 should be subtracted to arrive at the variance in Column 6. Variances will be enclosed by parentheses when the actual expense is greater than the budgeted amount. The variance percentage should be calculated to one decimal place by dividing the variance by the total budget amount.

Year-to-date actual and budget amounts in columns on the lower half of the form (omitted from the exhibit) should be calculated by adding the amounts for the month to the year-to-date amounts for the previous month. These totals must always add forward. Therefore any year-to-date adjustments must be included in the figures for the month as well as in the year-to-date figures. The variances and variance percentages should be calculated as has been described. The variable percentages to standard direct labor for both the month and the year-to-date should be entered in the final columns of the lower section. These should be calculated to one decimal place by dividing the actual variable expense by the period's standard direct labor. The year-to-date actual variable expense may be calculated by adding up the monthly amounts shown in Column 3 of current and prior reports.

Net direct labor should be entered at the bottom of Column 1. Standard direct labor for the period my be determined by multiplying the period's total

production, including only the production value added during the period as determined by production counts at various inspection points, by the standard hours allowed for the operations performed. Where standard hours are not in use throughout the plant, some approximation of efficient direct labor utilization should be made for each job, on a consistent basis, and added to the standard total. The direct labor standard hours should be multiplied by the average departmental rates to determine the standard direct labor to be entered on the form. Percentages of net direct labor to standard should be entered in the spaces provided.

The Offense — Forecasting; Defense — The Break-even Chart

Invaluable adjuncts to the monthly performance reports are forecast reports, which may be established on the same basis to permit a current look at the immediate future. The forecast reflects latest costs and prices, schedules, and probable changes, to make it possible for management to detect unfavorable trends far enough in advance to take action to minimize their effects. To do this, each month a forecast of the coming four months is prepared in summary form, based on the current production schedule. From this schedule, the required direct labor is determined, along with the amount of indirect labor which would be in line with the budget at that volume level. Through this means, employment and other expenses may be adjusted to the budgeted level before the first day of the period being forecast (rather than six weeks or more later), performance can be closely tied to the goal which has been established, and any departures from that expense level will be quickly flagged. Another technique which may be used to good effect is the comparison of both budgets and actual performance, by account, among similar plants, or the comparison of similar operations or functions in dissimilar plants. This method will disclose the best performance in the company, which can be used as a target.

This article has concerned itself primarily with manufacturing expense budgets, because this is the area most susceptible to control in line with short-term production and sales requirements. The areas of sales, engineering, and administrative expenses are less subject to variable control than to management edict, but must be watched, nonetheless. Budgeting in the latter areas may follow the "appropriation" form, in which programs are planned for definite periods in advance, based on over-all company objectives. Once the level of activity is committed, the budget normally continues in effect through the end of the commitment period, unless urgent additional requirements arise, or the economic climate changes appreciably. One method of controlling such appro-

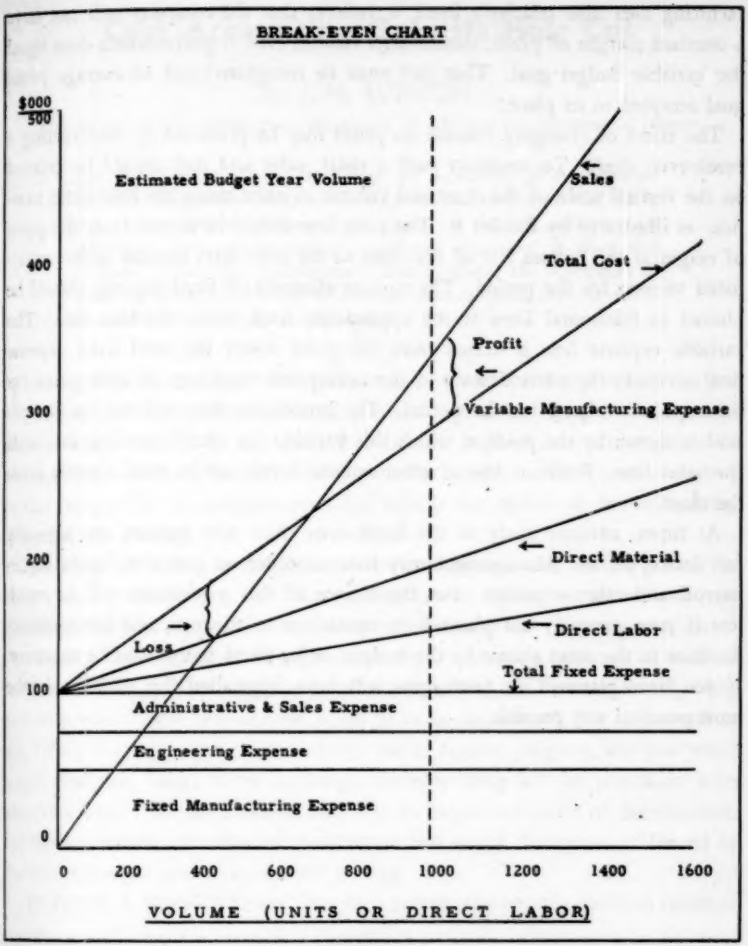

EXHIBIT 6

priation-type budget levels is through the use of project estimates and approvals to support total appropriations requested periodically from management.

If the budget is realistic and ties into the profit goal, and if the operations are planned in advance each month so that the expenses are limited to those justified by the volume of production, the company will be well on the way towards accomplishment of its profit objective. However, because of the effect of relatively fixed appropriation-type expenses, and other expenses in the manu-

facturing area also relatively fixed, it follows that the company will not have a constant margin of profit, month after month, even if performance does equal the variable budget goal. That fact must be recognized and an average profit goal accepted in its place.

The effect of changing volume on profit may be predicted by constructing a break-even chart. To construct such a chart, sales and cost should be entered on the vertical scale of the chart and volume in units along the horizontal base-line, as illustrated by Exhibit 6. The sales line should be drawn from the point of origin at the bottom left of the chart to the total sales amount at the anticipated volume for the period. The various elements of fixed expense should be plotted as horizontal lines at the appropriate level above the base line. The variable expense line is drawn from the point where the total fixed expense line intersects the vertical scale to the anticipated total cost of sales point for the expected volume for the period. The break-even sales volume for the period is shown by the point at which this variable (or total) cost line intersects the sales line. Profit or loss at other volume levels can be read directly from the chart.

At times, advance study of the break-even chart may indicate the necessity for drastic action. Management may have to order an across-the board cut in payroll and other expenses. But the chance of this misfortune will be much less if your company has planned its operations in advance, and has made reductions in the areas shown by the budget, or by trend analysis, to be excessive. If you have planned for profit, you will have forestalled this problem in the most practical way possible.

Cost Accounting Gets Its Hair Cut

by J. H. RUSHTON

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The use of direct costing in aiming cost accounting at an important but often overlooked objective—managerial planning is pointed up by the present author. Although not giving the method a blanket endorsement from an accounting standpoint, he makes it clear that if direct costing does nothing more than encourage the segregation of direct and fixed costs, it will be of great value to management in facilitating the use of informed judgment.

THE 1920'S ARE CREDITED with many new developments but probably the best known and most publicized of all is the advent of the "flapper"—that era of womanhood identified by the short skirt and the bobbed hair. During this era another idea was conceived which may prove as revolutionary to cost accounting as the flapper did to womanhood—that idea is the system of cost accounting termed direct costing.

Ridiculous as it may sound, there is an analogy between the flapper of the 1920's and direct costing, for direct costing can be defined as an ordinary cost system with its hair cut. The long hair referred to is the routine procedure of distributing fixed overhead through the inventory accounts into cost of sales. I recall that when, in those bygone years, my sister had her hair cut, I said, "Any girl who would have her hair cut is not fit to be my sister." My father said to me, "Son, it appears you're reactionary; you're against progress, and you won't accept changes. Looks to me as though the only thing left for you to do is be an accountant." We are thankful that it is no longer indicative of the situation, for the accountants of today are progressive and accept change, as evidenced by the recent interest exhibited in direct costing.

"In N.A.C.A. Research Series" No. 23, a noteworthy point is made, as follows:

> "Direct costing has sometimes been described as a plan for eliminating fixed costs from inventories. This description stresses an incidental feature rather than the prime objective of the plan, which is provision of information about cost-volume-profit relationships."

It is with this objective of direct costing that I wish to affiliate myself, for, as the Research Series Number 23 also states, "the development of factual information about the behaviour of costs and profits under conditions of changing volume and the effective presentation of the information to management is the area in which we industrial accountants can make the important contribution and earn our rightful place at the management conference table."

Some Basic Understandings

In order that there may be a common understanding of the direct costing method, it may be generally defined by drawing the two main distinctions between the principles of direct costing and those of ordinary cost systems which are being generally classified as "absorption costing." The prime difference is this: absorption costing normally merges direct and fixed costs in charges to the same accounts. Direct costing maintains a separate identity of direct and fixed costs in the accounts and on the regular accounting records. The second difference lies in the manner in which fixed costs are distributed among interim accounting periods. In absorption costing, attempt is made to relate fixed manufacturing costs to the period when products which received benefits from the manufacturing facilities are sold. In direct costing, the fixed manufacturing costs are considered "period costs" and, as such, are charged against income when they are incurred.

While we are dealing with theory and definitions, it will be worthwhile if we have a meeting of minds on those nebulous terms "direct" and "fixed" as applied to costs. The category of expenses referred to as "direct" is frequently called "variable" and sometimes called "controllable" costs and "product" costs. Probably the definition which comes to our minds first is that direct costs are those that "vary directly and proportionately with volume." To identify this definition with practice I like to add, "and which can be conveniently identified with a product or an operation." Examples of direct costs are direct material and package costs, direct departmental labor, and direct departmental expenses, such as utilities, specific maintenance, supplies, etc. In direct costing, variable expenses reach into the non-manufacturing category for such expenses as warehousing costs, freight out, royalties, salesmen's commissions, specific product advertising, and promotion, when they can be conveniently identified with the product.

Fixed costs, frequently referred to as "time," "period," "standby," or "sunk" costs—terms having slightly different connotations—are costs of having capacity to produce, which expire with passage of time and which bear no direct relationship to the rise and fall in production in a given period. They are predominantly management decision costs. Fixed costs are not limited to depreciation, insurance and property taxes—a common misconception of many outside the accounting profession—but include many other substantial costs. In some companies, at least, they may include salaries of supervision and plant clerical staffs and (the really big one) service department accounts which are sometimes so meticulously distributed and redistributed into production department expenses.

Of course, in the non-manufacturing category, general administrative, selling, general advertising expenses have usually been accepted as fixed expenses in the sense that they are charged off in the period incurred.

Direct and fixed costs are differentiated right at the start because the so-called difficulty of segregating direct and fixed expenses has been offered as an obstacle to the acceptance of the direct costing system. I have found in my management research work that statistical techniques such as scatter graphs, are mighty handy tools in deciding whether the accounts in the doubful area are predominantly fixed or variable and also at what point direct expenses become fixed, and vice versa. In final analysis, however, the solution is one of management decision and a not very difficult one. The problem may be narrowed down to one of sitting around the conference table and deciding, based on informed judgment, which expenses are variable and which are fixed—they will not be the same in all companies. The statistician's approach has been found effective and time-saving. It is to determine the degree of error in different alternatives. If placing an account in the direct or in the fixed category affects the final result by one or two per cent, put it in either! Your time can be better spent on more important decisions.

The Neglected Objective of Cost Accounting

If, up to this point, this paper has done nothing more than cover known material, it is to lay a foundation for what comes later. Now let us move into the need for and advantage of direct costing. As a part of the need for direct costing, we should first have in mind the objectives of cost accounting. In my mind, cost accounting has three main objectives. In inverse order of their importance, they are:

1. **Inventory valuation and over-all profit determination.**
2. **Cost control.**
3. **Pricing and other managerial planning.**

The first objective involves the determination of the portion of manufacturing costs which should be charged against income of the period and the portion applicable to costs remaining in inventories. The second involves the departmentalization of costs for budget comparision for the purpose of fixing responsibility. It seems to me that too many accountants make these two the prime objectives of cost accounting and leave to their spare time (which seldom occurs) a third, and equally important objective to which this paper is dedicated, namely, development and analysis of costs for pricing and planning purposes.

However, before we delve into this important objective, let us touch lightly on the first two and give initial attention to the matter of inventory valuation and profit determination. Cost accountants are making strides in cost accounting and, therefore, it is not necessary to emphasize that cost accounting is not an end in itself or that the statement placed on the president's desk is only worth its salt if it provides him with a realistic picture of the results of operations and the answer to the question, "How can we improve the picture in the future?" If we place on the president's desk a statement that says last month sales increased but profits decreased because production went down and did not absorb the normal amount of overhead, it is doubtful whether it is a very realistic picture.

Yet we know well enough that this is what frequently happens under the ordinary absorption cost methods, especially in industries with heavy fixed expenses, regardless of how well engineered the cost standards are. From a planning standpoint, the president might facetiously say: "If that's the way to make more money, let's put our emphasis on production and forget about sales." Here is a pertinent statement made by Charter Harrison as long ago as 1938:

> "It is a rather startling commentary upon established accounting methods that, as a result of a successful attempt to reduce inventories, the profit showing of a company will be falsely reduced and, conversely, that, when inventories are increased, the result will be an inflation of the profit figure." As quoted in "The Case For *Direct* Costing" H. W. Luenstroth *N.A.C.A. Bulletin*, August 1952.

The point is not so much the elimination or inclusion of a specific portion of overhead in inventories. I think that the proponents of direct costing are, in effect, saying: "Look fellows, we've got ourselves so all-fired involved trying to get costs down to a gnat's tooth that we've lost sight of our objective. There is no such thing as an absolutely true cost. Our costs statements at the best are rough estimates. Why knock ourselves out distributing and redistributing fixed overhead through the accounts when the ultimate answer is at best a rational estimate?" Thus it is that, perhaps, no doctrinaire approach, including application of direct costing, is necessarily appropriate to profit determination and inventory valuation.

As to cost control, have you ever asked a plant department head why his performance was only 80 per cent efficient last month, i.e., why he has an unfavorable budget variance of 20 per cent, only to receive an answer like this: "I have no control over the overhead. I don't need all these new shiny walls. I don't have to have the windows washed every week." And so on.

In short, it is a fallacy to attempt to force the responsibility for fixed overhead on the department head. He and the accountant have little control over fixed

costs at the production level. Mixing fixed and variable items merely camouflages the true accomplishment of variable cost control, the responsibility for which should rest with the department head. Many of the fixed overhead items are management decision costs and need to be controlled at that source. The proponents of direct costing offer their method as a means of differentiating between direct and fixed department costs, in order that responsibility can be fixed at the level at which such costs are incurred, thereby perhaps preventing unsound actions.

Right away, many will be likely to say: "We already segregate our fixed and variable costs. In fact, we make many special budget and variance analyses for our management setting forth the controllable and non-controllable costs." If you can say that, then you are certainly on the right track but, in preparing special analyses, some proponents of direct costing ask, "Are you duplicating efforts?" And then supply their answer, "If knowledge of direct and fixed cost is so important, it should be derived directly from the accounting records where the propriety and accuracy have a chance of being determined." I differ slightly with those who hold this opinion, in that special analyses are usually more dynamic and, therefore, the information is more useful if prepared statistically. Furthermore, such analyses are just as accurate as those derived from accounting records as long as they are reconciled (not necessarily tied in with) accounting controls. Again, it appears, direct costing may be of value, but is not required for satisfactory results.

Marginal and Break-Even Concepts Look Toward Direct Costing

Let us now turn our attention to the place of direct costing in achieving the third objective of cost accounting—the "coup de maitre" of the cost accountant, the developing and analyzing of cost data for pricing and other managerial planning. To begin with, the development of product costs for managerial planning and especially their analysis are, generally, an incidental outcome of the first two objectives of cost accounting but, when we consider that over the long term it is the components of the individual selling prices multiplied by volume which determine profit, we wonder if our approach to cost accounting might be in reverse.

We have heard more and more about the marginal approach to costing and planning, but we seldom hear the reasoning behind it. In the last ten years, the economists have worked their way out of the Keynesian level and are making some real sense about our economy. Those who have not studied economics during the past ten years will be pleased to know that, from the economist's stand-

point, it is no longer disgraceful to be a monopolist. In fact, the economists have given us a name. They say we are now in a category called "monopolistic competition," which is a hybrid of pure competition and monopoly.

The name is secondary in importance but of prime importance to accountants are the characteristics of monopolistic competition and its results. Monopolistic competition is a market which has certain characteristics. First, there are many firms selling the same or similar products which are differentiated by name, real or alleged quality and service, rather than by price. Secondly, one firm cannot change prices without consideration of the reactions of its competitors. Thirdly, it is not difficult for firms to enter or leave the market.

The foregoing characteristics probably involve most company situations. What are the results of monopolistic competition? Marginal costs and marginal revenue tend to equal in the long run and, in some instances, marginal costs exceed marginal revenue. (Marginal cost is the cost of producing one more unit and marginal revenue is the additional revenue derived from selling one more unit.) The most profitable price for the individual product is one at which the quantity sold will give a marginal revenue equal to marginal cost. A higher price may lower the quantity demanded and thereby yield less total revenue and a lower price may increase the quantity demanded and thereby cause abnormal manufacturing costs by requiring over-capacity production (overtime, etc.) or by encouraging the creation of excess capacity.

This condition is not an academic one. It actually happens, even though we seldom attempt to set it down. It has happened in many industries—the antibiotic and the television industries are current examples. If this condition is bound to occur, then why not present cost data in a manner to enable management to plan for it.

There is another condition very closely related to the marginal cost-marginal revenue analysis—one we are well familiar with, that is, the break-even point. We know that, until sales reach a point at which they equal fixed costs plus their own direct costs the company does not make a cent of money but, once break-even volume is reached, every penny earned over direct costs is out-and-out profit. This is what many call marginal or contribution income and what can logically be called direct profits, for this wording corresponds with the term, direct costs. The important point about direct profit is that, as long as selling price and direct costs do not change per unit, there is, generally speaking, no change in the amount of direct profit earned per unit, regardless of volume produced or sold. What occurs is a switch between the amount of real operating profit and fixed cost absorption. After the break-even sales are reached direct profit constitutes real profit.

Five Areas for Managerial Use of Direct Costs

The words "informed judgment" have been repeated from time to time in this article. Accountants have at their disposal a storehouse of knowledge and tools which can be used to assist management in arriving at sound decisions. True, management must make the final decisions based, to an extent, on judgment but there is a difference in judgments. There is plain rule-of-thumb judgment and then there is "informed judgment" based on dynamic data—data that will facilitate the determination of the direct profit contribution of products and lines and projections of the equilibrium point of marginal revenue and marginal cost and the break-even point. What is needed to enable management to use "informed judgment?" The same thing that is needed to achieve the first two objectives of cost accounting, namely, a segregation of direct and fixed costs.

What can management do with this information—this "informed judgment?" The real question is what can be soundly decided without it? There are many uses, but here are just five important ones:

1. **Decide whether to make or buy a basic material. That cannot be done intelligently without knowledge of fixed and direct costs.**
2. **Plan long-range expansion — not only plant-wise but market-wise. For instance, how much fixed costs will foreign sales expansion absorb?**
3. **Schedule product promotion for most profitable product mix. What products offer the greatest potential dollar direct profits? It is not *rate* of profit that pays dividends, it is *amount* of profit. If you have never prepared a product-mix chart you have a new adventure to look forward to.**
4. **Delete and add territories, customers and products.**
5. **Plan long-range and short-range pricing policy.**

To illustrate that all of these uses are not academic, here is a personal experience concerning the item of product deletion. The product deletion program of the company called for the culling of the price list of so-called unprofitable products. Typical of many companies, product profit was determined by deducting from sales value the weighted standard manufacturing costs and by deducting nonmanufacturing costs equal to a percentage of the sales value—the company-wide rate. Products were being tossed out right and left. Costs in the low-volume cost centers rose as a result of unabsorbed fixed costs. More products then became unprofitable and out they went.

Under an improved program, the cost department furnishes the fixed cost absorption of the low-selling items and, in an effort coordinated with the production planning activity, certain of these products are kept in the price list to absorb fixed costs until new products take their place or the facilities are reduced. One wonders how much fixed costs are not being absorbed which could be if the breakdown of direct and fixed costs had been known before the products were deleted!

What Makes Sense in the Treatment of Costs for Pricing?

Finally, what can direct costing do to aid pricing decisions? The advantages of knowing direct and fixed costs for pricing individual jobs or pricing to different classes of customers are well-known. The pricing of regularly published list prices in a multi-product industry is a more difficult matter. Here is where the "modus operandi" of the cost accountant is involved. (This does not mean to imply that cost is the only factor needed for pricing, for there are many others requiring consideration, such as, sales trends, market potentials, competitive prices, return on investments, etc., which we will not attempt to cover in this paper.)

Many people contend that a total unit cost, standard or actual, is all that is needed cost-wise to do a pricing job. However, have you ever looked up from your 21-column work-paper after computing a number of unit costs and said, "Brother, there must be a better way of doing this?" Perhaps you have noted that these unit costs—standard or actual—consist of 50, 60, or even 70 per cent overhead prorated on arbitrary bases, that the depreciation and taxes are based on 1930 costs (when you know it would take two or three times as much to replace the assets) or, conversely, that the costs relate to a very modern department and the company's competitor is using the "hay-loft of Mrs. O'Leary's barn." (And I speak from experience.) Should pricing decisions start with that kind of unit cost?

Think for a moment of other joint cost categories. For all the meticulous determination of manufacturing costs, what is done with the so-called nonmanufacturing expenses, whether general administrative, selling, advertising, warehousing, or other? These too are costs and subtract from profits. In some industries they amount to as much as, or more than, manufacturing costs. Yet instances are found where the nonmanufacturing expenses are assigned for pricing purposes to products at a percentage of the selling price. Would not consistency either call for similar treatment of manufacturing fixed costs or the distribution of the non-manufacturing expenses in the same meticulous manner as manufacturing costs. As a matter of fact, it is a good question—why accounting makes the arbitrary break at the gross profit level. Gross profit is like a comma placed in the middle of a sentence for no other reason than to give a pause for breath. Frequently, there is little reason for the classification of some sizable expenses above or below the gross profit line. As one illustration, there is a classic example of charging to manufacturing cost production planning, which starts production, while charging to administrative expense cost accounting which accounts for production.

In multi-product pricing, management needs to know whether each product can be competitively priced in the industry and still contribute sufficiently to direct profits, that is, fixed cost absorption and real profits, to justify keeping it in the price list. Furthermore, it is necessary to be prepared to move the price along with technological improvements toward that point where marginal revenue equals or approximates marginal cost and, thereby, attempt to maximize profits.

In brief, when we get down to brass tacks, the only useful part of the unit cost is the direct cost portion, for it comprises those elements that are reasonably comparable among firms in an industry. Does this mean that only the direct cost portion is needed? No, rather, on the premise of "different costs for different purposes," it means that the appropriate data should be readily available to compute unit costs based on various alternatives.

For Informed Judgment — Dynamic Data; For Dynamic Data—Direct Costing

It is logical to believe that management decisions based on informed judgment are likely to be more productive than those made by rule of thumb. Informed judgment comes from the knowledge of dynamic data such as that enabling future projections of direct profits, the equilibrium point of marginal revenue and marginal costs, breakeven point, etc. To provide dynamic data, costs—manufacturing and nonmanufacturing alike—should be compiled in a manner to give the following:

1. Direct cost of each product.
2. Fixed costs by production center, division or whole plant, whichever of the three or combination of the three, is the most realistic for the product line in light of industry conditions.

The foregoing data enables timely computation of, first, each product's contribution to total direct profit, that is, fixed cost absorption plus real profit (selling price less direct cost) and, second, projection of real operating profit of the product or product line under various alternatives (sales less direct costs and estimated share of fixed costs).

How does direct costing improve on full absorption methods in providing data for management planning? Most cost systems permit the analysis of data for planning purposes, but it is one thing to have the information when management wants it and another to say, "It's available, but we'll have to work it up for you." This type of answer is the reason why management sometimes turns to industrial engineers, statisticians and economists for cost projections. These men have learned how to make timely and rational estimates. That is

all any cost figure can, in fact, be. Accordingly, direct costing offers these three possibilities. The system should:

1. Expedite the achievement of the first two objectives of accounting, profit determination and cost control, by reducing the work connected with distribution of fixed costs and preventing these from obscuring the picture.
2. Provide over-all controls on the accounting records and leave to statistical methods the analysis and projection of costs in a manner of maximum benefit for the third objective, pricing and other managerial planning.
3. Change the philosophy of cost accounting by switching the emphasis from historical reporting to the more important analytical phase.

It should be stressed that direct costing for inventory purposes has not been specifically recognized as acceptable accounting procedure. Just as laws are necessary for a stable society, so are accepted accounting principles necessary for rational accounting. Therefore, it goes without saying that, before adopting direct costing for accounting purposes, its application to the peculiarities of the industry and company should be studied and, furthermore, it should be applied in a manner not to violate accepted accounting principles.

In the opening remarks of this article, reference was made to cutting the "long hair" of cost accounting, that is, the routine distribution and redistribution of fixed overhead. Thirty years ago, when direct costing first started, ladies found that they could cut off their beautiful but troublesome long tresses and still achieve their objectives—and with less work. Is it not time for accountants to cut off some of the routine of cost accounting and aim directly at their prime objective—managerial planning? If direct costing will facilitate this and still give a realistic picture of operating results, it is worthy of our serious consideration as acceptable procedure.

You Have to be Wide Awake to Control Inventories

by V. R. BECHTEL

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The hazards and necessities, alike, of carrying inventories come into view in the approach taken in this article, which includes extensive comments on general and particular internal and external situations which render inventory control a difficult matter. Data concerning the cost of inventory maintenance is given at the start, underscoring the need for holding inventory accumulation within limits.

INVENTORIES AND THE PROBLEMS INVOLVED in their practical control are broad and complex, almost limitless in the scope and form in which they exist. They cannot be dealt with just on the basis of physical quantities and specific values, but must be reckoned with in their broadest sense. To the owner of a specific inventory, this means in relation to plant capacity, to current and near future sales prospects, to cash available for inventory investment, to the inventory practices of direct competitors, to the profit results being obtained and to the current and near-term future volume of sales to be serviced.

An Estimate of the Cost of Carrying Inventories

In discussing the size of inventories we need to carry, with various of our people who invariably are convinced that our stocks are too low and should be increased, I often ask the question as to whether it is necessary to carry a larger inventory of the item in question than our treasurer can or should carry in his inventory of cash. When I provide evidence that we have less inventory (in time) of unobligated cash than we have in the inventory of the product under discussion, it is indeed surprising how quickly a refiguring job is done and the argument for more goods subsides.

We have made numerous studies to determine the cost of carrying inventories. Each time we come up with a different set of figures and each set of figures we have seen as computed by outside experts is also different. The answer is obvious. Different sets of inventories involve a diffierent set of costs to carry. We do find a range which can be accepted as applicable to varied classes of inventories.

We believe that range is within a 12 per cent to 20 per cent annual cost, the lower percentage applying to standard goods which do not deteriorate or go out

of date. In our company such items are bulk acids, alums, fertilizers, etc. Others fall into the higher percentage up to as high as the 20 per cent rate and include such items as packaged and dated pharmaceuticals, anti-biotics, certain types of dyes, etc.

On the broad picture, a recent calculation has been made to show the estimated average annual cost of carrying inventories by U. S. industry. Starting with interest on investment at 3 per cent (should perhaps now be nearer 5 per cent) and carrying down through obsolescence, handling, custody and records, deterioration, spoilage and repair, insurance and taxes, and storage facilities, an annual percentage cost of 20 per cent was arrived at. If the interest rate is increased, we have a 20 per cent to 22 per cent annual cost ratio. Another study uses a 6 per cent interest rate and covers three different inventories. It arrives at 17.3 per cent, 18.2 per cent and 22 per cent for these, respectively.

These various figures would seem, in general, to confirm our conclusion that a range of 12 per cent to 20 per cent annual cost, depending on the type of goods, is within reason. Think of that cost! To carry each $1,000,000 of inventories the profit and loss account is charged each year by anywhere from $120,000 to $200,000. You may say tax savings will offset 52 per cent or more of that cost. Can we not also say that every dollar saved by industry creates more taxes as well as more profits? Through creation of more taxes, the rates can be reduced.

Economic Conditions Make Inventory Problems—(and Vice-Versa)

One of the very serious problems industry has had to face for several years and which seems to be becoming increasingly worse is the constant necessity of building up excessive stocks for protection against approaching wage negotiations. Then, when agreement has been reached, production must be cut until stocks become normal again. With one or two reopenings annually and interrelated plant contracts expiring at different times, a company is on an inventory merry-go-round.

We know from experience—time and again—that, when we have run along on a plateau of high business activity for many months or years, the eventual recession will catch our enterprise and all business with large inventories. We see—again and again—many individual businesses and many industries forced to unload excess goods on a falling market. Always produced during a period of high business activity, excess inventories usually represent high-cost raw materials, high labor costs due to overtime and the less efficient efforts of labor when jobs are plentiful. Also, quality is often relatively poor, since customers have to accept whatever is available when goods are scarce and production is pushed

without adequate time to exercise close quality control. In the reverse situation, inventories are usually insufficient to meet an upsurge in business which eventually gets underway. Filling orders is delayed until labor forces are built up and trained, sales losses occur, and we lose the appreciation in value on the upswing in costs. Stable production and steady jobs for plant and other personnel are difficult to maintain.

Then, too, the building up of excessive inventories on an industry-wide scale is an important contributor to a future recession and over-conservatism during a recession can and does prolong and aggravate a low-business period. In 1953, hopes and plans exceeded reality and a sizable chunk of production was added to inventory. We have been reaping the results since. In spite of production cuts, production outran consumption. A situation was created which could feed on itself through unemployment and dumping of goods. Had we exercised better control, a delicate situation could have been minimized, perhaps avoided.

Assignment of Responsibility for Control of Inventories

It is human nature for sales people to want large and varied enough inventories to make immediate shipment of every customer's order, large or small. It is human nature for production people to want to run plants at high and steady rates to secure low costs and to provide steady work for plant employees. It is human nature for purchasing, warehousing and scheduling personnel to want to protect themselves by having goods on hand to fill every order promptly. We know from costly experience that, under such conditions, inventories become greatly excessive and costs to do business go higher than on any other possible operating basis. From experience we know that many times as much net profit is lost for ourselves and for all United States industry through carrying too much than is lost due to having too little inventory. Few people who have a responsibility in connection with inventories fully understand that carrying normal inventories is a costly business and to carry excessive stocks is even more costly.

In our company, the responsibility for inventory control starts with top management, where policies are established. The carrying out of these policies is passed on to divisional or departmental executives who are assigned specific operating responsibilities. Divisional executives are given full responsibility and are charged with producing satisfactory results. Quotas on inventories in dollars and in quantities are established for each inventory location. These quotas are flexible, depending on current and expected future sales, and are arrived at in cooperation with division executives. Comparative reports are prepared to show whether results are in line with the quotas. Studies and analyses are made con-

tinuously of each inventory to pinpoint any excessive build up or shortage of first-line stocks and particularly any accumulation of off-grade, obsolete or slow-moving stocks. Once such goods have been located, they are continually followed up until disposed of to the best economic advantage.

There is a great variety of opinion as to the responsibility direct sales personnel should carry in respect to inventories. I feel there can be no greater mistake made in placing responsibility or in detracting from the primary objective of sales people than to load upon them direct responsibility for inventories. Sales people would be most unsuccessful in their sales work if they were not enthusiasts and over-optimists as to what they can profitably sell in a given line. Usually sales people fight hard to have complete control of inventories of products they sell. When this is permitted, inventories almost always become excessive and greatly unbalanced. The result of the policy becomes all too clear. When excesses develop, I know of nothing that destroys a salesman's enthusiasm and initiative so fast as being obliged to sell off an excessive inventory. Sales people should have their "say" on inventories but some hard headed fellow, who has responsibility for production and sales as well as of inventories, should make the final decisions. In our case that fellow is the divisional manager.

We back him up with the facts and statistics and his judgment is always measurable against actual sales results of sales staff. To this end, we have a central inventory committee of which I am the chairman, and of which representatives of the operating divisions and of the purchasing and treasurer's departments are members. This committee has no authority to determine specific inventory levels. It has the responsibility of developing the facts and of providing these facts to divisional executives on specific and overall inventories, as well as of providing top management with a record of accomplishment and future plans on inventories to make certain that mnagement policies are carried out. Moreover, each of our operating divisions or major plants has an inventory committee, consisting usually of representatives from the plant manager's office, and purchasing, production, engineering and accounting departments. These committees operate generally in a way similar to the head office committee and provide all parties concerned with copies of minutes of their meetings and such reports, analyses and recommendations as are found helpful in keeping inventories under control.

These groups are in excellent position to keep close contact with (and to assist in training as well as acquainting with current policies) all the plant personnel which has a responsibility in the maintaining of and creation of inventories. Thus, on the whole picture, responsibility for inventories is spread over a large percentage of all employees and practically all employees contribute to the inventory situation in some way. Some of those participating are purchas-

ing agents, engineers, department heads, sales executives and salesmen, production executives, plant managers, schedule clerks, production superintendents, foremen, warehouse and stock clerks. Even each plant production worker—not to mention top management—has a part to play in the creation of and in the control of inventories.

Tie-In of Inventories with Sales

In practice most companies strive to keep inventories in line with sales. For the most part that means current and past months' sales. Experience shows most inventories are at a peak when sales are highest and at the lowest when sales are scraping the bottom. This is not what should happen. What is needed is to maintain inventories in line with future sales needs, that is, from tomorrow. The basis for forecasting future sales starts with the establishing of a trend line based on past performance. This can be done with peaks and valleys plotted above and below the trend line. In well-managed companies it is possible to go back over records and to establish ratios of inventory to sales. By judgment and by making necessary eliminations and additions, a normal inventory ratio can be established. The next step to be taken is the forecasting of sales and proper inventory levels for future operations.

In forecasting future sales, especially near term, it is important to give consideration to the inventory history and current position of industry as a whole, with emphasis on stocks of competitors. An over-inventoried status for competitors can presage an industry-wide sales decline that will carry the company's sales down also. It may be in for considerable price-cutting and dumping of stocks on a timid market. If you are aware of such a situation in advance, it can be improved by arranging to be low in stocks of old-line products and by proper timing of an aggressive promotion campaign on new products or redesign of old products.

To project probable future sales a great deal of statistical information is necessary to evaluate where business stands in relation to the top of a boom or the bottom of a recession. There is a wealth of economic facts available from many sources. The problem is one of selection to best fit the company's needs and to arrive at a correlation and evaluation which will provide a sound guide. Some of the important guides to management may be mentioned here. Trends of buying by consumers as above or below normal in relation to consumer savings and current disposable income can be established. This will help to tell whether consumers are in an over or under inventory position. This type of simple statistic represents the kind often ignored in the evaluation of future sales. Con-

sumer income has to be measured as to the part which is disposable. Taxes are an important factor and their effect needs to be carefully appraised.

Inventory Turnover Is Important

To create the proper background for inventory and operating control requires a great deal of time. In the meantime control must be exercised. In the interim, some help can be given by tightening up on inventory-to-sales ratios when sales are high and by loosening up when a period of recession has been running.

In our inventories we have a great range of goods—much bulk goods on which turnover occurs within one or two weeks or less, with some being piped direct to a consumer plant for current production with only one to two days supply carried in storage tanks and also a great many products in the field of dyes and pharmaceuticals on which the production cycles range as high as three to eight months. We find an average inventory of three to three and one-quarter months is necessary and the most economical for us to operate within. It must be considered that we have thirty-five plants and more than one hundred and fifty warehouse points in the United States, Canada, and foreign countries.

In many of our products we must necessarily carry varied specifications and package sizes. This calls for a word on the problem of the variety of package sizes and varied specifications of individual products. We are constantly striving to keep the variety down in number and to reduce those that get into the line and are found to be light sellers. I know one large pharmaceutical house which found itself with five thousand items and package sizes in its lines. This was poor business from a profit standpoint and resulted in a great deal of excess (and an unbalanced) inventory. A grand clean out was made, reducing the five thousand items to one thousand three hundred. Inventories were quickly reduced by more than thirty per cent and dollar sales increased by fifteen per cent in each of the first two years, considerably above the trend. Needless to say profits also improved greatly.

Slow Stock, Uneven Production, Peaks and Valleys

The problem of disposing of inventories which are no longer first-line goods requires a great deal of attention and effort. Much is re-worked or salvaged to the extent possible. If it is necessary to destroy a portion, the full details are listed on a special form and, after securing the necessary operating approvals, these forms are forwarded to the treasurer's department for final review and for approval to destroy the items and to write off book values. Certificates of actual

destruction are secured and retained in the various files as authoritative evidence of final disposition. Also, one of the major problems, and a costly one, when it occurs, is what to do with the inventory which for some reason has become slow-moving or dormant. Each situation of this character needs to be studied and a procedure adopted which will clear out the goods at the least possible loss. The main thing to have in mind is that the earliest loss is almost always the least loss.

But how do we determine the exact point when peak sales are reached in a booming business period and when the bottom is reached in a period of recession. We do not believe anyone, except by sheer luck, will ever hit either the peak or the bottom exactly. By constant study, we find it is possible to recognize the plateau rather than the peak and the valley rather than the bottom of a recession. We are giving a great deal of time and effort to this most important point of control of our inventories—more than to any other phase or problem of control. To the extent we are eventually successful in these studies, we will be able to establish real control at the right time, that is, before raw materials are purchased and before production schedules are prepared.

Repercussions of Too Much Control

In conclusion, I would like to point out that it is possible to create inventory troubles just as fast by too much and too tight inventory control as it is with too little control. The impact of this is more than company-wide. I see proof of it in some dealings with our suppliers as well as with our customers. We go too far at times in our controls and succeed in upsetting our suppliers' production schedules and force them into extra costs and unbalanced inventories. On the other side, customers can and do establish such tight inventory control that our schedules and inventories are badly disarranged. Emergency shipments and emergency production schedules, as well as partial car or truckloads at added costs are required to serve these customers who feel proper inventory control is to live on a hand to mouth basis. In short, when we run the gamut of discussion on inventory control, we realize what a broad and complex problem we have to deal with and also the enormous effect that inventory control has on the success or failure of our capitalistic system. We can never afford to let down for a minute in continuous and intelligently directed effort to improve our controls, even while realizing that Utopia will never be reached.

Practical Cost Reduction Is Programmed Cost Reduction

by ROLFE WYER

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The time to start cost reduction is now and the time to quit it is never, this paper indicates. Specific to the disadvantages of what is characterized as "crash engineering" and equally specific to the "do's" and "dont's" of starting a continuous, company-wide cost reduction program, this article is also supplied with examples of summary and detail reports on the progress of cost reduction and the problems which may arise in carrying it out.

ALL INDUSTRIAL ACCOUNTANTS are familiar with the current emphasis on cost reduction. Companies which for fifteen years have thought only of how much costs will increase next year, are now faced with "holding the line" or actually reducing their overall cost of operation. Since the accountant reports profit and loss and hence is now reporting that margins are shrinking, it is logical that management should turn to him for counsel at this time.

What Kind of Cost Reduction Do You Want?

An accountant confronted with these circumstances should carefully examine the alternative courses of action which are open to him. Cost reduction techniques usually fit under one of the four categories listed below:

1. "Forcing" the desired costs from the desired profit margin.
2. "Brute force" using "rule of thumb" to determine objectives.
3. Assigning goals by analysis of past cost trends.
4. Programmed action.

Exhibit 1 shows how the first three techniques are used. Purposely, it includes some of the errors commonly made in this type of calculation. Six of these may be noted here. The management is insisting upon holding the net profits close to that of the base year, even though the effective tax rate has increased. Material costs include subcontract costs which should be separated for this purpose. Cost reduction is not anticipated in the material category, a point which is usually justified on the theory that "such a reduction is difficult to measure." Volume is calculated on the basis of sales dollars instead of standard plant hours or a similar measurement. There is arbitrary adjustment of variable costs on the basis of sales volume. Such a broad stroke of the pencil is not a practical goal to those charged with the responsibility of controlling

the costs. The assumption is made that fixed costs should remain fixed at all volume levels and shows ignorance of the true nature of these costs. Fixed costs are usually no more than a reflection of the variability of total expense within given volume ranges. Particularly at volume levels close to capacity, there is little relationship between so-called shut-down costs and the amount of fixed costs being used for budgeting and forecasting purposes.

In spite of these arguments, many accountants will maintain that they have seen these techniques work over and over again and that this empirical fact outweighs the theoretical objections presented. How many times have we all heard of executives whose first step in taking over a new business is to cut all costs ten per cent and, after that has been completed, to cut ten per cent again. Despite these justifications, this sort of "crash engineering" has a number of

CALCULATION OF FORCED COST REDUCTION GOALS
(In Millions of Dollars)

	Base Year		Forecast for Next Year				Reduction Goal Increase/(Decrease) Over Forecast	
			As Presented		Adj. to Base Year			
	Amt	% to Sales	Amt	% to Sales	Amt	% to Sales	Amount	%
Net Sales	50.0	100.0	75.0	100.0	75.0	100.0		
Variable Costs								
Material	21.0	42.0	35.0	46.7	35.0	46.7	-	-
Direct Labor	5.8	11.6	8.0	10.7	8.0	10.7	-	-
Indirect Labor	5.2	10.4	10.2	13.6	7.7	10.4	(2.4)	(23.5)
Supplies	1.9	3.8	3.5	4.6	2.9	3.8	(.6)	(17.1)
Other	1.1	2.2	2.0	2.7	1.7	2.3	(.3)	(15.0)
TOTAL VAR. COSTS	35.0	70.0	58.7	78.3	55.4	73.9	(3.3)	(5.6)
Variable Profit	15.0	30.0	16.3	21.7	19.6	26.1	3.3	20.2
	6.3	12.6	10.0	13.3	6.9	9.2		
Fixed Costs								
Manufacturing	4.3	12.6	10.0	13.3	6.9	9.2	(3.1)	(31.0)
Selling	1.7	3.4	2.5	3.3	2.0	2.7	(.5)	(20.0)
Administrative	1.1	2.2	1.3	1.7	1.2	1.6	(.1)	(7.7)
Other	.4	.8	.8	1.1	.5	.6	(.3)	(37.5)
TOTAL FIXED COSTS	9.5	19.0	14.6	19.4	10.6	14.1	(4.0)	(27.4)
Profit Before Taxes	5.5	11.0	1.7	2.3	9.0	12.0	7.3	429.4
Taxes	2.2	4.4	.8	1.1	4.5	6.0	3.7	462.5
NET PROFIT	3.3	6.6	.9	1.2	4.5	6.0	3.6	400.0

NOTES:
1. Variable costs are adjusted on the basis of a 50% increase in sales volume.
2. Fixed costs are adjusted on the assumption that they should remain constant except for basic wage increases, emergency amortization, etc. 10% was allowed for these factors.
3. Effective tax rate has increased from 40% in base year to 50% for current year.

EXHIBIT 1

drawbacks. In the first place, while it may be at least partly effective when a new and alert management is taking over a "stumbling" business, the approach has little value where the same management is being continued. Certainly, if the management is poor enough to permit conditions which can be corrected by the mere stroke of the accountant's pencil, it is a certainty that such conditions will re-occur unless the management is changed. Moreover, companies which are mismanaged enough to permit such wild chopping do not have sufficient control of basic data to determine whether such cuts really are savings or whether they are being more than offset by increases in other cost categories.

DO'S AND DON'TS OF COST REDUCTION

Do

1. Obtain the support of top management — without it you have not got a program.
2. Assign a cost reduction administrator outside of the financial division if you have been making arbitrary and "crash" recommendations. Perhaps this should be done anyway, unless you enjoy an exceptionally good reputation with your shop personnel.
3. Place responsibility for leadership in the cost reduction program with men who have a demonstrated ability to develop and successfully install money-saving ideas.
4. Include all cost elements in your plan. There is no such thing as a cost element which cannot be reduced over a period of time and with changes in business conditions.
5. Prepare an outline of the program, such as Exhibit 3. Make sure that each man participating knows all of the costs within his area of responsibility.
6. Include all costs necessary to effect savings in your cost reduction budget. Impress upon management that in cost reduction, as in all business, you must spend money to make money.
7. Incorporate planned savings in your operating budget.
8. Follow up to see that estimated savings are realized.
9. Plan savings in the accounting department as an integral part of the program.

Don't

1. Introduce arbitrary goals. Goals will be set high enough to obtain funds for new equipment.
2. Assign divided responsibility.
3. Establish too many committees. In most companies there is little need to set up a group of specialized committees which will only irritate regular operating personnel and defeat the very objective of the program. Also such committees tend to "die out" after several months. We are seeking a permanent program.
4. Concentrate all attention on overhead.
5. Organize your program according to your chart of accounts. Just because accountants find this organization of the expense data convenient does not mean that cost reduction can logically be carried on in this way. You will find that your cost reduction breaks down into programs such as might be exemplified by:
   Elimination of diamond wheels
   Improving and extending usage of portable power hand tools
   Standardization of material specs
   Programs like these spread across the standard material labor and burden breakdown of costs. The accountant must first set them up according to the way they were conceived and then obtain the usual accounting breakdowns.
6. Claim credit for savings made by others. The cost reduction program is company-wide — not the private property of the financial department.
7. Manipulate charges to make paper savings.

EXHIBIT 2

The mere fact that a department continues to function after such a reduction is made is not a guarantee that any cost savings were realized. Then, too, such techniques cannot be used for a continuous program.

Essentially, the drastic approach relies on implied comparison with past performance. Past actual experiences do not necessarily provide criteria for future operations. Many companies find themselves faced with new product lines increasing complexity of old product lines, with new pension, sick leave, and vacation agreements, with increasing social security taxes, emergency amortization and increasing need for modernization of the plant and facilities. Such factors all tend towards increasing overhead expense and reducing direct labor. Blind application of cost reduction, in the light of these considerations, will surely result in loss of respect for the accountant who "engineered" it, if it is the accountant who does so.

It Depends on What You Think Cost Reduction Is

At this point, a definition of cost reduction is needed. Cost reduction is a major dynamic element which is an essential part of the operation of any successful company. It is not an isolated program, nor is it a technique which should be used only in times of crisis. Cost reduction is a continuous organized effort, utilizing all facilities available within the company to effectively reduce operating costs and increase profit. It is an indivisible part of any budget and forecast program. Without it, the company will be smothered by gradually increasing costs. Hence, a cost reduction program differs from a cost reduction project by the methods discussed above in that it is based upon informed estimates from individuals or organizations within the company whose primary responsibility is to reduce cost. Each cost element is regularly examined as a part of the budget program and responsibility for control and reduction of it is clearly established. From this review, cost reduction goals for the fiscal year are established and are incorporated in the regular operating budget.

The techniques used in obtaining these goals are thus the same ones which have been used successfully in budget programs for years. They are proven methods which not only supply the greatest degree of accuracy but also the largest results. There is no known substitute for the cooperative efforts of every one in the organization working willingly towards one goal in controlling expenses. Since, in many cases, management will be impatient with a long-range program of the type described here, it is important to begin quickly and correctly. In Exhibit 2 are a few "do's" and "dont's" to be followed in establishing any such plan.

COST REDUCTION SUBJECT OUTLINE

A. *Raw Material and Purchased Items*

1. Selection and substitution
2. Revision of specifications to reduce waste
3. Use of waste materials
4. Volume buying — pool purchases with local companies
5. Cheaper freight
   a. Pools
   b. Lighter packaging
   c. Type of transportation
   d. Industry Association action
6. Build or buy

B. *Shop Methods—Machine Tools and Heavy Equipment*

1. Improvement by replacement, modification or addition
2. Process methods
   a. Cutting tools — use and maintenance
   b. Lubricants, coolants, and cleaning agents
   c. Special tooling — fixtures, dies, etc.
3. Elimination and combination of operations
4. Layout

C. *Shop Methods — Small Equipment and Hand Operations*

1. Hand tools
   a. Power
   b. Other
2. Special abrasives
3. Inspection
4. Protective materials
5. Layout
6. Cleanup
7. Scrap and Rework

D. *Maintenance and Construction Methods*

1. Preventative action
2. Breakdown analysis
3. Centralize operations
4. Reclamation and salvage
5. Materials and supplies
   a. Fabrication of repair parts
   b. Extending life
6. Modification and replacement of equipment

E. *Power Conservation*

1. Water reclamation
2. Line modification and analysis
3. Leakage control
4. Leveling peak demand
5. Promoting consciousness of waste

F. *Office Methods and Systems*

1. Equipment modernization and replacement
2. Systems analysis
3. Pool operations
4. Internal printing program
5. Forms analysis and control
6. Records destruction
7. Supplies
   a. Selection
   b. Volume buying
   c. Distribution control

G. *Material Handling*

1. Motorized equipment
2. Hand equipment
3. Containers and packaging
4. Conveyors and automatic flow
5. Layout of storage areas
6. Storage methods
   a. Space
   b. Labor
   c. Contamination

H. *Communications*

1. Work simplification training
2. Suggestion plan
3. Profit sharing publicity
4. Telephone and Telegraph
5. Traveling
6. Advertising

I. *Organization*

1. Job analysis
2. Reassignment of responsibility
3. Special study of supervision

J. *Other*

1. Investment

EXHIBIT 3

Exhibit 3 is an outline of a cost reduction plan for a medium-sized manufacturing plant. Some parts of the outline have been expanded more than others. This shows that these phases are being worked upon currently. You will find out that you cannot work effectively to reduce all of your cost elements simultaneously. Hence, the outline should be readily expanded or contracted to reflect where current emphasis is being placed.

Reporting Progress Against Budget; Other Cost Reduction Aids

A primary requisite for a successful cost reduction program is to regularly report the progress against it. Exhibit 4 is a summary report for the overall program. The same form is used to report in detail against each phase. Budget

COST REDUCTION PROGRESS REPORT

Project	Responsibility	Month of January					10 Months to Date		
		Gross savings	Expense	Net savings	Budget	% Acc.	Net savings	Budget	% Acc.
Materials	Brown	14,162	335	13,827	9,016	153	$ 121,200	$ 90,160	134
Shop Methods-Mach. Tools	Williams	13,792	5,649	8,143	8,010	102	75,303	80,100	94
Shop Methods-Hand	Haines	16,620	4,762	11,858	11,052	118	99,510	110,515	90
Maintenance & Construction*	Rollins	4,829	2,749	2,080	4,016	52	25,412	40,160	63
Power Conservation	Kennedy	1,560	249	1,311	1,520	86	2,150	15,200	14
Office Methods & Systems	Bacon	13,622	3,578	10,044	10,540	95	80,163	105,400	76
Material Handling	Gilmore	10,260	1,259	9,001	7,520	120	64,119	75,200	85
Plant Services	Bruce	5,283	2,029	3,254	1,275	255	(7,181)	12,750	-135
Organization**	Allen	-	1,000	(1,000)	1,530	-	(5,005)	15,300	-
Other	-	2,261	575	1,686	1,641	103	6,471	16,415	39
Total		82,389	22,185	60,204	56,120	107	$ 484,500	$ 561,200	86

* Pallet reclamation program lagging. ** Organization study by Williams & Co. not yet complete.
Parentheses indicate negative amounts.

EXHIBIT 4

figures for the cost reduction program are included. The basic planning for these budget figures includes:

1. Estimate of the gross savings to be realized from each program.
2. Quarter in which such savings will become effective.
3. Estimate of gross expenditures including capital items and imputed interest to be made under each program.
4. Analysis of gross expenditures to determine monthly effect in current fiscal year.
5. Calculation of net monthly expense reductions by quarters and averaging in order to obtain overall annual budget.

Since cost reduction projects are always in process under the program, the rate of savings achieved will be more or less constant throughout the year. However, barring unusual circumstances, the net rate of savings for the last month of the year will be larger than that of the first month of the year. Expenditures made to gain cost reductions not realized, are charged against the program. Note that such an item appears under "organization" in Exhibit 4. All successfully completed projects are dropped from the cost reduction budget at the beginning of the new fiscal year. Unsuccessful projects, where costs are running equal to or more than savings, are left in the program until the condition has been corrected. Spot checks of projects are made in subsequent years to make sure that savings gained in the first year have been continued.

A good progress report is a prime requisite and yet it would be a shortsighted accountant who did not utilize a number of other available cost reduction tools. A profit-sharing plan is one such tool. A poster series will be helpful in connection with it. Even if you don't have a profit sharing plan, you should use your billboards, house organ, and other publicity media to promote cost consciousness throughout your organization. Overprinting on forms, displays of scrap parts with price tags assigned, slogans stamped onto certain key-operating supplies—all of these promote a cost-conscious organization.

Along with the type of publicity described above, you should publicize successful cost reduction ideas. This is a positive approach designed to stimulate

COST REDUCTION REPORT--INCOMING FREIGHT

Paid for January, 1954	Zone One - Local			Zone 2-to 1000 Miles			Zone 3-to 2000 Miles			Zone 4-Over 2000		
	Weight	Cwt. Rate	Amount	Weight	Cwt. Rate	Amount	Weight	Cwt. Rate	Amount	Weight	Cwt. Rate	Amount
Air Freight	-	-	-	3,842	6.42	234	1,659	10.93	2814	572	25.79	147
Railroad												
Super Alloys-Carload	-	-	-	-	-	-	-	-	-	125,650	3.43	4,310
Other	42,659	1.05	448	63,472	1.75	1,111	29,463	4.93	1,453	24,651	6.43	1,585
Sub-Total Railroad	72,997	1.08	790	129,479	1.44	1,866	49,632	4.82	2,391	1,155,487	2.67	30,861
Truck												
Volume & Commodity	100,641	.75	755	40,693	1.29	525	29,618	2.49	737	100,633	2.45	2,467
Any Weight	26,492	1.30	344	80,951	2.49	2,016	46,219	4.76	2,200	40,693	5.81	2,372
Sub-Total Truck	127,133	.85	1,099	121,644	2.04	2,541	75,837	3.87	2,937	141,326	3.97	5,609
Water - Chrome Steel	-	-	-	-	-	-	-	-	-	154,300	1.61	2,484
Total - January '54	200,130	.94	1,889	254,765	1.82	4,641	127,128	4.41	5,609	1,451,685	2.65	38,954
Mo. Average - 10 Mos. to Date	265,400	1.01	2,681	222,691	1.84	4,098	115,610	4.40	5,087	1,296,742	2.84	36,827

* Will be billed to customer. ** Lead time now cut to 25 days.

EXHIBIT 5

cost reduction thinking. For example, smaller cost reduction ideas can be written up for insertion in a notebook to be maintained for each key supervisor in your program. Larger ideas can be publicized by exhibits or perhaps written up in the house organ along with the notebook release. You should create a manual of cost reduction which will always serve as an ever-growing refutation of the argument that it cannot be done or that costs are already at their absolute minimum. To this end, give work simplification training at all supervisory levels. Insist that supervisors pass on this type of thinking to leadmen. Moreover, do not overlook the suggestion box. To stimulate thinking, pin up posters next to your suggestion box displaying successful ideas for which cash was paid.

Also, check the possibility of cooperating with your customers, other manufacturing plants in your area, and your suppliers. Freight pools, reducing the weight of shipping containers, and industry negotiations to alleviate onerous Government-reporting requirements, are a few items in this category.

Examples of Special Cost Reduction Reports

In addition to the progress reports already shown, specialized reports should be issued to implement the cost reduction program. Such reports can only be

designed with a knowledge of how costs can be reduced. There is no standard form which will serve for all cases. Essentially, these reports stimulate action in areas where reductions are planned. They can be either temporary or permanent according to need. The four cost reduction reports presented as exhibits to this article have been selected at random. They are all designed to stimulate cost reduction action and, to a lesser degree, to record savings realized from such action. Flexibility in both preparation and use is essential in this reporting.

Often the number of freight bills processed in an industrial organization is overwhelming. Because many of the bills are small and because distribution of each bill to the proper account and inventory item is an arduous clerical task, they are often "lumped" into a single account or applied to raw material on a

COST REDUCTION REPORT
ANALYSIS OF DIRECT LABOR BY FACILITIES USED

Type of Facility Used	Month of January					10 Months to Date		
	Act. Prod. Hours	Rework	Total D.L. Hours	Std. Hours	Eff. %	Total D.L.	Std. Hours	Eff. %
Machine Tools								
Grinders	1,253	14	1,267	973	76.8	10,189	9,651	94.7
Tapping Machines	254	25	679	742	109.3	5,496	5,375	97.8
Others	4,251	227	4,478	4,493	100.3	45,618	43,212	94.7
Sub-Total Machine Tools	39,164	1,312	40,476	40,538	100.2	387,068	368,585	95.2
Hand Operations								
With Portable Power Tools**	30,062	2,649	32,711	28,463	87.0	222,612	179,050	80.4
Other	40,633	6,593	47,226	28,462	60.3	623,900	396,413	63.5
Sub-Total Hand Operations	70,695	9,242	79,937	56,925	71.2	846,512	575,463	68.0
GRAND TOTAL	275,463	16,894	292,357	226,475	77.5	2,356,819	1,658,191	70.4

* Poor tooling. Job being retooled.
** Percent of handwork utilizing portable power tools has increased from 18.1% in April, 1953 to 42.5% this month.

EXHIBIT 6

factor basis. Whether or not the foregoing accounting technique is used, freight offers a fertile field for cost reduction. The variety and number of rates and type of transportation make it a certainty that savings are possible unless considerable attention has already been given to the subject. Exhibit 5 is a report designed to stimulate constructive thinking on this subject. It will be noted that, at the particular time this freight report was issued, the following cost reduction projects were in process:

1. Negotiations to reclassify certain superalloys to chrome steel, thereby reducing the rate.
2. Pooling shipments at a central point with local companies, in order to obtain a carload rate.
3. Use of water transportation for metals shipped from Eastern states.

The type of equipment used in direct labor operations is, of course, the keystone for improving labor output. Although the report shown as Exhibit 6 does

COST REDUCTION REPORT MACHINE BREAKDOWN January 1954

Machine No.	Description of Machine	Dept.	Date of Breakdown	Mts Time Mech.	Mts Time Opr.	Cause of Breakdown	Comment - Correction Action
170071	Potter & Johnson 42E	22	1-2-54	8 Hrs	.2 Hr	3	
050472	Natco 14 Spindle Drill	22	1-5-54	3 Dys	2.0	5	
180001	36" Bullard	23	1-9-54	6 Hrs	.5	6	Replacement ordered
130101	Chambersburg 35x48 Hammer	02	1-11-54	2 Dys	1.0	4	Operator disciplined
217371	Minster 400 Ton	03	1-11-54	4 Hrs	.2	2	
050001	Allen 2 Spindle Drill	05	1-17-54	3 Dys	.5	6	
280271	36" Tannewitz Saw	16	1-23-54	1 Hr	.2	4	
113016	Taylor 36" Thrust	18	1-26-54	4 Dys	20.0	-	Machine still down. Assy. line stopped. Machine temporarily moved from Dept. 24.
180186	42" Bullard	27	1-30-54	2 Dys	1.0	1	
	Total for Month			16 Dys	26.0 Hrs.		

CAUSE OF BREAKDOWN CODE

1. Design of Equipment
2. Defective Manufacture
3. Operating Beyond Designed capacity
4. Careless Operation
5. Poor Maintenance
6. Equipment worn out

EXHIBIT 7

not in itself provide sufficient detail to measure savings being made, it does furnish a comprehensive analysis of equipment being used. At the time this report was issued, emphasis was being placed on a power hand tool program. The success of this program can be measured by the report.

Exhibit 7 is a chronological listing of each machine breakdown which has occurred during the month. Corrective action does not stop with the issuance of this report. A case record is made of each breakdown and this record is studied until a definite cause has been determined. Although action cannot be taken to remedy the cause of every breakdown, much useful information is developed in this way. For example, in the case of the Natco Drill marked with Code 5—Poor Maintenance, trouble was traced to a faulty gear. Upon analysis of the file on this particular piece of equipment, it was found that this gear had been installed by the company maintenance personnel just a few months before under emergency conditions. It was not practical to purchase the gear and one had to be made in the maintenance shop. Examination of the broken gear revealed that it had not been annealed to resist wear, and operating procedure was accordingly corrected.

The next two exhibits show as many methods by which the cost of long-distance toll calls may be attacked. Although the amount of reporting may seem

LONG DISTANCE TELEPHONE EXPENSE SUMMARY

Week Ended_____

Department	This Week Number of calls	This Week Average minutes	This Week Average cost	This Week Total cost	Month to Date Number of calls	Month to Date Average minutes	Month to Date Average cost	Month to Date Total cost
20 Experimental	6	6.7	3.28	19.69	8	8.8	3.68	29.45
35 Stain. Steel Found.	2	5.0	2.19	4.37	3	6.3	2.58	7.75
98 Admin.	9	20.9	14.51	130.56	29	15.1	10.25	297.24
Total	309	9.4	4.90	1,513.88	940	8.7	4.72	4,435.51

EXHIBIT 8

TOLL CALL AUTHORIZATION CARD

Name:_____ Badge No.:_____

This card is issued to help you make money for the company and yourself through Profit Sharing. Your telephone, wisely used, will improve your productivity and speed up your job. But REMEMBER ....

'Nearly all the important words spoken in the history of man were spoken in less than 3 minutes.'

So when you pick up your phone

BE SURE YOUR CALL IS NECESSARY
BE PREPARED
BE BRIEF

Authorized By:_____ Date:_____

EXHIBIT 9

elaborate for the cost involved, these reports are prepared by the telephone company operators when not on duty at the board. First, a daily telephone slip is made up at the time the call is placed and is turned over the next morning to the departments making the calls. A weekly report (Exhibit 8) is summarized from the daily slips and issued each Monday morning. The authorization card (Exhibit 9) is issued as each employee is authorized to place toll calls without his department head's approval. It will be noted that these reports are directed primarily toward the length of the call or else to whether or not telegraph could have been used. It is recognized that the telephone is a useful business tool and discontinuing phone calls often results in false economy.

A Growing Need

The need for cost reduction is increasing every day. At the beginning of this paper, some of the panaceas frequently used in this field were examined. They were all found inadequate for the job. A program for continuous cost reduction has been presented, including several examples of reports issued in support of it. This program, properly administered, will provide a sound operating tool to obtain greater profits. Ultimately, its success will depend upon the caliber of personnel involved. Above all, accountants should remember that they are participants in the program and not oracles. As we urge cost reductions in other phases of the operation, we must seek the same in our own activity.

How We Developed and Use Standard Costs

by DAVID H. ALLEN

Chief Accountant, U. S. Rubber Company, Los Angeles, Calif.

The picture of particular costs, cost considerations, and operating problems in the industry emerges in this story of a standard cost system with a history of growth and growing utilization in the solving of management problems related not only to manufacturing economies but to diverse other operating situations. "Ideal" standards are used. In the terminology employed, plus or minus variances from standard are designated as "penalties."

TO PROVIDE BACKGROUND for the details of our standard cost system, it is desirable to give a few facts concerning our business. First, as a company, we have an annual sales volume which falls just short of a billion dollars. Our products consist of almost every conceivable type of rubber article, with substantial production also in the chemical, plastics and textile fields. A large portion of the company's business consists of tires, tubes and related products. Five plants are operated by the tire division, of which our Los Angeles plant is one. Each plant's overall accounting system must conform to the company's accounting manual. In addition, the cost system in each tire plant has been standardized to a large degree and is subject only to variations which might be brought about by local conditions, such as physical differences in the plants or possibly differences in the labor contracts.

Following the practice of many successful American companies, we have taken steps to assure uninterrupted flow of raw materials by building or acquiring plants to produce many of our major raw materials. We have a substantial investment in rubber plantations in the Far East, mainly in Malaya and Sumatra. Five textile mills are operated in the southeast supplying cotton and rayon fabrics. A rubber chemical and reclaim plant is operated in Naugatuck, Connecticut. We also operate, for the Government, two synthetic rubber plants and have acquired ownership to date of two additional special purpose synthetic rubber plants.

Production and sales of the Tire Division are divided into replacement sales, original equipment sales and special brand sales under cost-plus contracts. Replacement sales are handled through a large number of independent tire dealers, who are in direct contact with the consumer. Original equipment business is handled with automobile manufacturers who purchase tires and tubes (preassembled) for installation on new automobiles and trucks.

Special brand business consists of sales to large customers, of merchandise produced under their brand names and to their specifications as provided by contracts in effect.

Our standard cost system is deep-rooted, having had its beginnings in the 1920's. Each division of the company and each plant follows the same basic system. However, many variations develop when it is applied to the multitude of company products. We had some very interesting and challenging problems at the Los Angeles Plant during World War II when several new commodities relating to fuel cells production were introduced and it became necessary to give considerable attention to the procedures which allocated the cost between the new commodities and the existing commodities. In discussing our standard cost system, the following will be touched on:

1. The methods of setting standards.
2. The various element, product, and penalty breakdowns.
3. Some idea of how our system is used in factory operating control, and in budgets and forecasts.

Choice of Ideal Standard Costs

We decided upon ideal standard costs for use on a company-wide basis. Our management reviewed several possible alternative systems which were available to us. These were as follows:

1. An expectancy standard set up with the idea of predetermining actual cost with sufficient cushion to absorb all inefficiencies. This we felt completely dropped the idea of control of costs, although certain advantages might exist in the field of pricing. There is always the danger of pyramiding estimates in such a system.
2. An attainable standard representing a cost set up on the basis of an arbitrary goal, against which actual cost would be measured. This system is quite often favored by factory operators as it fits in logically with most of the normal methods for the reduction of manufacing costs. If we have been running 2 per cent scrap, it would be logical to try to reduce to 1½ per cent. Therefore, why not set a 1½ per cent standard for the operation? If we have been running 8 per cent re-operation, why not set the standard to include 6 per cent re-operation labor? The difficulty with this approach is that, too often, temporary conditions may distort the setting of proper standards. It is, furthermore, almost impossible to establish consistent, attainable standards in a widely varied operation such as ours, involving many locations and sets of conditions.
3. Ideal standards, from the point of view of accurate commodity, product and outlet costs, are the best assurance against erroneous or arbitrary allocation of costs or expenses. With respect to pricing, they form a fully reliable basis for the build-up of actual or projected unit costs. They are the only standards that permit complete tie-in with specifications, labor standards and burden budgets.

Setting the Standards; Costing Procedures

The first step in establishing standard unit costs for material is to obtain a standard price for each raw material. This is done at the start of each year on the basis of a study by the purchasing department of probable market condi-

tions. The prices are based on most efficient ordering quantities and may take into consideration long-term contracts or commitments for major raw materials. All plants use the identical raw material standard prices. The material specification for each item to be produced is stated in terms of theoretical material weight of its components, i.e., finished compounds (by stock number), fabric (by style and type), and beadwire. This theoretical material weight takes into consideration factors of shrinkage, fabric stretch at solutioning and calendering operations, and tolerances provided at the point of fabric cutting. A recipe sheet for each finished compound provides the standard cost for each material used in the finished compound. In order to illustrate the component parts of the standard cost of a passenger casing, Exhibit 1 shows a tire cross section,

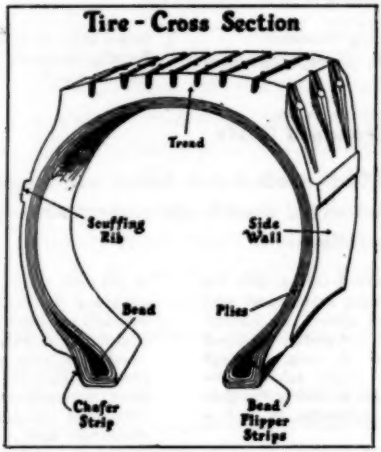

EXHIBIT 1

which illustrates in detail the tread, sidewall, plies, beads, chafers and flipper stocks.

Although, using the above data, it would be possible to develop a unit standard material size cost for each item produced, this would mean developing such costs for some 1200 items, a large number of which may be subject to change each month. Therefore, in actual practice, we develop a unit standard material size cost only when required for a special study. Material cost of production is calculated in total by accumulating total weights actually consumed by finished compound number, fabric style and beadwire type. These weights are extended in total by standard costs as reflected on recipe sheets or for each style of fabric and type of beadwire.

Significant changes in tire constructions are reflected in standard material cost each month. As such changes are apt to be numerous, it is impracticable to incorporate all changes in the current month or to divide the month's production for the purpose of applying different standards in the same month. A practical solution has been adopted, under which all changes through the fifteenth of the month are incorporated in the standard applied to production for the month. Changes subsequent to the fifteenth are carried over to the following month.

Labor in standard unit cost originates with the time study taken by the industrial engineering department and the time standard for each operation issued by this department. Labor standards are built up departmentally and, contrary to the procedure for material, a unit cost by size is developed for both labor and burden. In Exhibit 2 will be seen a calculation of standard labor and applicable burden rate for a popular size automobile tire. Included in the unit

STANDARD LABOR AND BURDEN FACTORS--AUTOMOBILE TIRE

Brand _____ Size _____

Dept.	Labor Operation	Unit Std. Labor Cost	Std. Burden Rate
10	Solutioning Fabric	.0300	4.260
13	Mixing & Calendaring Stock	.0200	2.300
14	Tread Tubing	.0500	2.760
20	Cutting Plies, etc.	.0100	1.550
24	Beads	.0500	.650
28	Merry-go-round Building	.2500	.700
35	Assembly, Bagging & Debagging	.1000	.830
37	Curing	.0700	----*
59	Balancing	.0200	.720
40	Finishing	.0900	.820

* Based on Curing Cycle.

EXHIBIT 2

size cost calculation are the unit allowances for setup labor and for special cost elements. The extension each month of unit production by the unit size costs for labor and burden results in current standard cost of production by cost element, which is the basis for process relief.

For finished goods control, an additional extension is made at control standard cost. Control standards are set once each year and remain unchanged for a period of one year. The difference between control standards and current standards becomes the change in standard penalty which is applied specifically against each brand produced.

Our goods-in-process accounts, covering the standard costs of material, labor and burden, are divided into the following major commodity divisions:

1. Millroom (common to all commodites).
2. Casings.
3. Tubes.
4. Camelback.
5. Repair material.

Charges to the process accounts for materials originate from issues of raw ingredient materials from stores. These ingredients are compounded in the mill-room. The cost of production of finished compounds is transferred to each commodity, based on the pounds of finished stock actually mixed during the month.

Sub-accounts in the goods-in-process ledger are provided under each commodity for the following elements of cost:

1. Crude rubber.
2. Synthetic rubber.
3. Natural latex.
4. Synthetic latex.
5. Rayon.
6. Nylon
7. Chemicals.
8. Wire.
9. Reclaim.
10. Other fabrics.
11. Labor.
12. Setup labor.
13. Burden.
14. Special cost elements.

Labor input to process at standard is developed from the labor distribution of the payroll. Burden input is obtained by applying standard burden rates to standard labor input. The goods-in-process accounts are relieved by means of entries for process scrap, finished scrap, the standard cost difference to cover materials substituted in place of the materials listed on specifications, and for transfers between commodities and to special cost elements. Finished production of firsts and seconds is then costed at standard cost, credited to goods-in-process and charged to finished goods and seconds loss, respectively.

Each month an inventory of goods-in-process covering all materials in various stages of processing is obtained. Part of this inventory may be a physical count but, due to the difficulties faced in taking a complete process inventory while the plant is in operation, a portion of the inventory is usually taken from unit records in our planning department. This inventory is costed at the current standard cost of material, labor and burden, by commodity and cost element. It is then compared with the book inventory and an entry prepared to adjust the book inventory to physical. The adjustment is debited or credited to penalty accounts for material, labor or burden usage. Our process accounting is completed in five working days following the close of the month.

Development of Cost Penalties (Variances)

Direct materials are carried in stores at monthly average cost. Perpetual inventory records are maintained which reflect each material, showing both units and dollars. Actual costs are refigured at the close of each month to reflect the actual cost of purchases during the month and the new average actual price is used to cost issues for the month. Materials issued to work-in-process, supported by material requisitions, are priced at actual cost for the relief of stores and at standard cost for debiting work-in-process. The difference is

charged or credited to purchase variation. Purchase variation becomes a penalty applicable to the standard cost of finished goods produced. For selling price purposes or for any other reason, when it is desired to obtain actual material cost, ratios of purchase variation and material usage penalty are applied to standard cost by element. Such ratios are usually on a year-to-date basis, except in forecasts. For these, new ratios are developed for the period under consideration.

Direct labor includes all labor operations in manufacturing departments which can be definitely charged to specific products without being allocated on an arbitrary basis. Standard allowances for direct labor have a direct relationship to the wage scale paid the operators. Service functions are classed as direct labor, even though the work is not expended directly on the product, when the service men and others form part of a group and are paid upon the volume of production handled by the group. The production of the operator is reported on a daily time card or on a consolidated pool sheet. Approximately 5000 standards are used in reporting units of production and operators' time. Basically, an absolute hour standard related to units of production is used. Absolute hours produced are compared with actual hours to obtain percentage of efficiency. Standard wage rates are obtained from rate charts at given levels of efficiency. Excess labor costs are coded on time cards to reflect the following:

Day-work excess.
Learners.
Makeup—Bad stock allowance.
Machine not operating properly.
Absentee replacement.
Excess operations or operators.
Delay time—Mechanical
Other
Re-operation
Overtime
Scrap Labor

These excess labor costs are paid for at their own standards or at a percentage of regular hourly rate. Such costs do not become a part of standard labor but are treated entirely as labor effectiveness penalty. Labor excesses are recapitulated by code under approximately 2000 labor operation numbers, which serve to identify the cost and permit accumulation and analysis on a weekly basis. Based on time cards and group pool sheets, a labor distribution is prepared segregating actual payroll between standard labor and labor effectiveness penalty by code. The labor distribution also breaks out indirect labor operations, which are chargeable to burden, setup labor and various special labor functions covered by special production orders. To develop actual cost of direct labor, ratios of labor effectiveness penalty and labor usage penalty are applied to the standard cost of direct labor.

Approximately 120 production and service departments or burden centers are used for the accumulation of burden. Each month the actual charges for burden items are accumulated for each department and an actual burden dis-

tribution is completed for the purpose of allocating the expense to commodity. This distribution is handled in an orthodox manner, distributing service department expense to production departments on a number of different bases designed to recognize the principle of service rendered. Items of cost entering into the burden element include the following:

1. Salaries paid: management, supervision, technical, and clerical.
2. Indirect labor—examples are repair and maintenance labor, janitor service, and warehousing and shipping labor.
3. Supplies, such as repair and maintenance materials, lubricants, small tools, fuel, purchased power, and stationery and office supplies.
4. Accruals for payroll taxes and employee benefits.
5. Other direct expense, such as telephone tolls, tabulating equipment rental, and contributions.
6. Fixed expense, including depreciation, taxes, and insurance.

Predetermined standard burden rates are developed at the beginning of each year. At this time, budgets for each of the burden items are established based upon each department operating at capacity based on operation of twenty days a month. Budgets for items such as salaries, indirect labor, and supplies are reviewed with each supervisor. A budgeted burden distribution is made to clear service departments into benefitting production departments. A standard burden rate is then calculated for each production department by dividing budgeted burden at capacity by standard direct labor at capacity. It is not unusual to have a standard burden rate of more than 200 per cent of labor in departments which contain heavy equipment, such as banbury mixers and calenders. Standard burden input to work-in-process for the month is obtained by applying the standard burden rate to standard direct labor in each production department for the month.

Now we come to the burden penalty phase of burden accounting. The difference between standard and actual burden is divided into two parts:

1. Penalty as a result of not operating the equipment full time or at its capacity. This we call burden volume penalty, which is the measure of the degree of absorption of fixed expense.
2. Penalty as a result of inefficiency, such as using more supplies than budget provides or for carrying an excess number of people on the payroll. This is known as burden expense penalty.

Under our procedure, fixed charges are fully absorbed at capacity operation. Therefore, at capacity no volume penalty results. Below that, a debit to volume penalty, representing underabsorbed fixed expense, is the result. Above that capacity, as defined, the budgeted burden line is below standard burden and a credit to volume penalty is the result, representing overabsorbed fixed expense (during heavy selling seasons, the plants will occasionally operate on six and even seven day week schedules). For a good many years, a modified burden distribution of budgeted burden was made to obtain a commodity breakdown for the calculation of volume penalty. This has been simplified, however, and

now a series of charts are used which give an accurate picture of budgeted burden for each commodity at various levels of operation.

Segregated Costs

Due to the nature of our business and to the sizable dollar value of our overhead, it has been found desirable to segregate a number of special cost elements from normal material, labor and burden. Separate allowances are provided in standard cost for most of these elements and separate penalty accounts are provided, with actual costs of material, labor and burden, where applicable, accumulated for each element. These costs are as follows:

1. Purchasing, receiving and stores expense.
2. Scrap loss.
3. Mold depreciation.
4. Wrapping and packaging.
5. Seconds loss.
6. Curing bag expense.
7. Tire engineering and development.
8. Flaps.
9. Automotive assembly cost.
10. Millroom costs.

Purchasing, receiving and stores expense, as the title indicates, covers the procurement and handling of raw materials. Separate burden centers accumulate its gross cost. The allowance in standard cost is computed as a percentage of standard material based on a study made once each year. The basis of distribution for the respective burden centers is tonnage of finished goods produced (by commodity).

With respect to scrap, the following types are accumulated:

1. Mixed stocks.
2. Solutioned or calendered fabrics.
3. Uncured tires and tubes.
4. Cured tires and tubes.

By the expenditure of a certain amount of reoperation labor, some of this material may be salvaged and worked off in the same product, or downgraded and utilized in a cheaper stock. The remaining scrap is costed at the standard value of material, the standard cost of labor expended to point of scrapping, and standard burden applicable thereto. No allowance in standard cost of finished production is made for scrap, under our system of ideal standard costs. Close attention is given to scrap, however, with a number of analytical reports which measure scrap on a daily, weekly or monthly basis against preceding periods and against goals established periodically.

Molds used in producing tires represent an important element of cost. Due to competitive and other conditions, a mold may become obsolete after a limited time, as when a new tire-size is adopted by the automobile manufacturers. Molds are, therefore, depreciated over a period of only three years. The allowance in standard cost for mold depreciation is based on the number of units estimated to be cured during the year.

Wrapping and packaging consists of the actual cost of tire wrap used mainly for white sidewall tires, also labels, tube and camelback cartons and containers, plus actual packaging labor and applicable burden. Allowance in standard cost of the finished product is made for standard material cost of packaging, plus standard labor and applicable standard burden. Burden is cleared through the same burden center as for finished production and is transferred from there to the special cost element classification.

All tire companies are faced with the problem of seconds. This represents merchandise containing minor defects, not suitable for sale as first class merchandise but having a good sale value at reduced prices, since seconds will give a limited service on the road. All seconds are expensed as produced, with the recovery when sold used to reduce the loss. The seconds loss penalty account, therefore, represents the actual cost of seconds produced for the period less recovery on seconds sold. Finished seconds in inventory are controlled in the same manner as firsts but on a memorandum basis.

A large number of curing bags are used in producing tires. These are produced in a special burden center, with actual cost charged to this special cost element. The allowance in standard cost of finished tires produced is calculated on the basis of the average number of cures obtained from each bag. Included in this cost element is the cost of making repairs to bags damaged in process, also the credit for any salvage value which may be obtained when bags are scrapped.

Experimental and development work comprises a large part of our annual budget and, consequently, is handled as a separate cost element. This work is largely directed from the Detroit plant. All units transfer engineering and development expense to Detroit which handles distribution to product.

Cost of flaps used in certain heavy service casings is broken out as a separate cost element and applied to the affected casings.

Automotive assembly cost, covering the expense of assembling tubes in casings for delivery to automobile manufacturers, is segregated as a separate cost element and applied specifically to original equipment business.

Numerous procedures have been written covering the methods used to distribute penalties arising in common departments to benefitting commodities. The largest of our common departments is the millroom, which is treated in practice as a separate commodity. All ingredients or compound materials must clear through the millroom for blending into recipes used in individual commodities. This is generally accomplished by mixing master batch stocks, which are later re-mixed into finished compounds. We may have as many as 400 different recipes used in a single month. The standard cost of finished com-

pounds mixed is used as a basis for relieving millroom in process account and charging the proper commodity accounts, as determined by the extension of the pounds of each recipe multiplied by the standard cost of each element including millroom labor and burden.

Using the standard cost of finished compounds mixed, as a basis, each millroom penalty account by element is distributed to commodities. In the case of millroom volume penalty, however, a special basis is developed on the capacity of millroom equipment for servicing each commodity. This basis is pre-studied at the beginning of each year, at which time the equipment in the millroom is allocated to each commodity based on that commodity's capacity requirements for the year. Thus, we follow the principle of distributing millroom penalties (controllable) to commodity on an activity basis, while volume penalty (unabsorbed cost of fixed expense) is distributed on a capacity basis.

Use of Standards In Control Reports and Forecasting

Operating control reports furnished to management are of two types. First are the reports of labor, burden, scrap, curing bags, etc., which contain comparative measurement of excess cost against standards and against goals established in advance. An example of this type of report is a weekly labor report, showing by department and operation number the standard cost of labor for the week and an analysis of each type of labor excess by code, together with percentage to standard. This report contains percentages for the past three weeks and also a goal at which the foreman or supervisor is expected to operate.

Second, we have reports through which detailed information concerning our operation is exchanged with the other plants in the tire division. The purpose of this type of report is to help each plant in its attempt to equal the performance of the best plant for an individual segment of cost. Much data is exchanged between plants in such analyses. Generally speaking, cost per thousand pounds of production is used as a measurement of the various elements of cost in interplant comparisons. For example, one of the most important reports to our management is the report which analyzes in detail conversion cost in terms of cost per thousand pounds. Conversion cost does not include direct material, as it is felt that local management has but little control over market prices. Instead, conversion cost is the cost of changing the material into a finished product. It consists of labor and burden elements and includes scrap loss and all of the other special cost elements. Again, a size cost report which gives a breakdown of the various standard cost elements and penalties is exchanged with other plants. This serves to direct our attention to costs which are out of line with other plants.

Standard costs are likewise used in preparing forecasts of cost of production on an annual as well as a quarterly basis. The procedure followed is to obtain an estimate of the units to be scheduled during the respective periods. These are extended at the standard cost in effect during a base month to develop total standard cost of forecast production. Estimated penalty ratios are then developed by a study of probable future market prices, the trend of labor penalties and of scrap penalties, the effect of new labor-saving equipment which may be put into use, the effect on volume penalty of the proposed level of operation, and any proposed methods savings which can be forecast. Actual forecast cost of production is developed, by commodity and element, by the application of estimated ratios to forecast standard cost of production.

Management Works This System Hard

In conclusion, a few remarks should be made about the flexibility of our system. It seems that standards play some part in almost every major procedure, system, or decision which is reviewed by our management. This applies to special cost studies, investigation concerning new products, production forecasts, selling price calculations, inter-plant cost comparisons, and accounting procedures of all types. The individuals comprising our management have almost without exception had long experience with standard costs. Its members depend upon standards as a means of measuring performance and for making the decisions which are vital to our operations.

As our business has grown, we have seen our standard cost system expand to provide for additional cost elements, products, or outlets, as required, and contract when the need is eliminated. As our company grows along with the rubber industry, we are certain that standard costs will continue to play an active and vital part in its development.

Cost and Sales Control in the Canning Industry

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Seasonal and other features of the canning industry are portrayed in this paper which describes the principal cost control and sales budgeting media and procedures used by one company. A postscript is included on the applicability of direct costing to the canning industry.

ALTHOUGH THE SUBSTANCE of the specific problems treated in this article is unique to the canning industry, the form of remedies applied would be applicable in many situations. A brief description of the industry will serve here as a general frame of reference. The particular canning field to which this paper relates is the California fruit and vegetable canning industry. It is comprised of approximately sixty-five operating units.

The industry is dynamic in respect to growth, methods of production and methods of distribution. Its growth, measured in cases produced, has been from fifty-eight million to one hundred million in the last ten years. The trend toward mechanization has been constant and is gaining pace. It has been remarked, with a great deal of truth, that a cannery is rebuilt every year. As regards distribution, buyers have changed their buying habits. They no longer purchase regularly in large quantities. Small shipments are the order of the day. Contracts under which a buyer would purchase his annual requirements have become one-sided. When market prices go down, buyers want consideration or cancel their contracts. In a highly competitive business, such as this industry, contracts made with buyers are almost impossible to enforce. Therefore, the methods of selling demand realistic appraisal. Endeavors in this respect on the part of canners are becoming more assertive.

Importance of the Cost Accountant in the Canning Enterprise

All of these changes have had their impact on the cost accountant in the canning industry. One cogent reason for thorough cost work in the canning business is the competitiveness in the industry. To some extent, this competitiveness stems from the necessity of having to sell varying quantities depending upon the crop year. Moreover, a good deal of the new year's pack is sold before the total crop results are known. Forecasting the supply and demand status is difficult and yet it is very important to sound marketing. Further, the canning indus-

try is a low-margin-of-profit-industry. On the basis of published data the profit results will range from a loss to not more than six per cent on sales.

Industry competitiveness can be illustrated in still another way. A uniform accounting classification is used by most companies to provide the validity of comparisons. The costs are compiled by products and the canners participating in the cost program for a particular product are divided into three cost groups, high, middle, and low. The grouping is done on the basis of logical unit cost ranges into which the entire range can be divided. Generally, only the low cost group will show a profit. Success in competitive situations require cost facts.

One cannot talk about a need for cost accounting without thinking about the cost accountant. In the canning industry the cost accountant needs imagination and fortitude. Imagination is needed for him to see the relationships between the various components of the enterprise which he is especially trained to focus and interpret. Balance of these relationships often spells success or failure.

Let me describe two instances of failure in the exercise of sufficient imagination to see or report these relationships. When making an audit of a medium-sized canning company some years ago I found redundant records. There were detail cost statements, profit and loss statements by products, and supporting statements galore. The allocations of cost were made correctly to the tenth decimal place. The cost accountant was perturbed because the resultant unit costs were not aliquot parts of the total cost in every computation! The daily production report of peaches which he used, showed an erratic relationship among the grades packed. The cost accountant could not explain it. The production superintendent, when contacted, said, "When fruit deliveries from the orchard are slow, I pack the poor grades delivered. When the deliveries are faster than I can conveniently handle them, I dump out the poorer grades." The company eventually went out of business. Would the story have been different if the cost accountant had possessed more imagination, if he had been less engrossed in the arithmetic of the symbols, if he had been more conscious of the actual referents these symbols stood for? I am inclined to believe so. This incident of the grades was probably indicative of the many opportunities he had for constructive service.

As another instance, a company in receivership had a few months before, floated a million dollar stock issue. The money had vanished before the underwriters had time to issue the regular stock certificates. The dynamic character of the canning industry certainly was obvious here. This company was primarily a frozen food packer. Part of the funds were used to finance a canning operation. The management was convinced that this had been the mistake. The post-mortem analysis disclosed that the canning operation was profitable and

that the money was lost in other ventures. Would this story have been different if management had known this relationship from the beginning? Again, I am inclined to believe so.

Now as to the fortitude a cost accountant needs. Well, the industry was founded by rugged individualists. They prided themselves on an ability to orient themselves cost-wise while walking through the plant and listening to the clicking of pitting machines and the hissing of steam boilers. They have also believed that there could not be much difference between two canners' costs and have often been dumbfounded to learn through their industry cost program that these differences more nearly resembled the difference between rags and riches. The progress made by the Canners' League in establishing uniform cost accounting in the industry has done much to make the operating men see cost accounting in a new light. However, the realization that the road to greater predictability of management decisions is through cost analysis and not cost synthesis is far from prevalent. The cost accountant must stay ahead of the changes and be bold in the interpretation of his findings.

The Company and the Cost System

A brief description of our company's cost system may be helpful in abstracting the most from observations on cost problems made in this paper. First, a word about the company. We are a cooperative association of growers of fruits and vegetables in California and operate two plants in which we pack about two million cases a year. Our operation begins in April and ends in the early fall, with peak employment about two thousand. The fact that we are a cooperative does not affect our cost problems. (It does make our financial accounting more complex.)

A canning operation for fruits and vegetables, such as ours, consists of the following:

1. Supervision of harvesting of fruits and vegetables. These are the raw materials of the production operation.
2. Grading the delivered raw materials.
3. Preparing the fruits and vegetables for canning. This covers washing, peeling, coring, pitting, slicing, etc.
4. Canning. This covers sorting the prepared fruits for grades and placing them in tin containers.
5. Cooking. This operation includes adding sugar, sealing the tins and sorting the cooked tins by sizes and grade marks.
6. Warehousing. This covers stacking of cans in warehouse, labeling cans and packing them in various sizes of fibre cases, and shipping out cases on sales orders.

My company's cost system is structured to conform to the processes outlined above. It also conforms in general to the industry's system as published by the Canners League. It differs in respect to detail, in making use of more primary

cost divisions. Under our system all costs are charged to one of four major categories. These are:

1. Direct manufacturing costs.
2. Manufacturing overhead.
3. General administrative overhead.
4. Direct selling expenses.

The first recording of all costs is on a functional basis. Direct manufacturing costs are later grouped and allocated to products. Overhead and direct selling costs are distributed to products as a percentage of total direct costs or of sales value of the product.

The allocation of direct manufacturing cost is made by the use of factors (percentages of relationships). There is a factor for each size and grade packed. These factors relate the various units packed to a common size and grade, which

ILLUSTRATION OF "BASIC CASE" COMPUTATION

A
Quantitative Cases

	Actual Cases Packed	Size Case	Factor	Cases Basic 2 1/2 Size
	100	48/8 oz.	.60	60
	170	24/303	.57	97
	370	24/2 1/2	1.00	370
	360	6/10	.91	327
Totals	1000			854

B
Qualitative Cases

	Cases Basic 2 1/2 Size	Grade	Factor	Cases Basic 2 1/2 Standard Grade
	50	Fancy	1.30	65
	460	Choice	1.15	529
	270	Standard	1.00	270
	74	Pie	.50	37
Totals	854			901

EXHIBIT 1

is called the basic case. This is done in respect to the quantity of unprepared fruit required for a particular size and also in respect to the time required to process it. Separate basic cases are computed for the various steps, such as preparation, canning, etc. In addition, a qualitative factor is worked out for the various grades. These factors measure the value left for a particular size and grade after deducting from its market price all costs except the raw material cost.

Exhibit 1 shows the techniques used in computing raw product basic cases. The upper section shows how the quantitative cases are computed and the lower section shows how these same quantitative cases are converted into qualitative

basic cases. The quantitative cases are used to allocate the direct preparation labor costs and other items which relate directly to the quantity of unprepared fruit in a particular size. The qualitative cases are used to allocate the purchase cost of raw materials, that is, the amount paid to growers for the fruits. In each instance the total applicable dollars are divided by the total basic case to obtain the cost per basic case. The cost is then multiplied by the applicable factors to obtain the unit cost for a particular actual case. The factors in the above illustration relate to yellow cling peaches. For other fruits they will be somewhat different.

Factors have been worked out for the distributions of the following separate direct labor functions:

1. Direct preparation.
2. General preparation.
3. Direct canning.
4. General canning.
5. Direct cooking.
6. General cooking.
7. Stacking and labeling.
8. Shipping.

It can be seen that the above grouping corresponds to the basic processes. The groups also represent the departments into which the production operation is organized. The term "general" refers to the work performed in support of the labor expended "directly" on the raw material. This covers such items as attending pitting machine operators, oiling equipment, cleaning up, etc.

Daily Control of Direct Labor

The seasonal character of the industry renders daily controls imperative. The average canner packs a year's sale in less than five months. Direct labor for the various products ranges from six per cent to twenty-five per cent of total cost to produce. We have found a daily report to be a very effective tool of control. We give each department foreman the results of a day's operation of his department. He gets this information about ten o'clock the following morning. The data is expressed in unit costs of direct or general labor. He gets this information in chart form. The data is plotted on semi-logarithmic charts as seen in the Daily Labor Report (Exhibit 2). Although the advantages of the semi-logarithmic over the straight coordinate grid are too well known to be labored here, I would like to point out one practical advantage not always present in a situation. Our unit costs in the various departments differ considerably, from a few cents to more than a dollar. Since the slope of the curve on a semi-logarithmic chart is determined by the rate of change and not the amount of change, foremen can compare notes with valid satisfaction.

An understanding of logarithms is not necessary for the interpretation of the charts or for their preparation. A chart is produced by means of a pre-printed

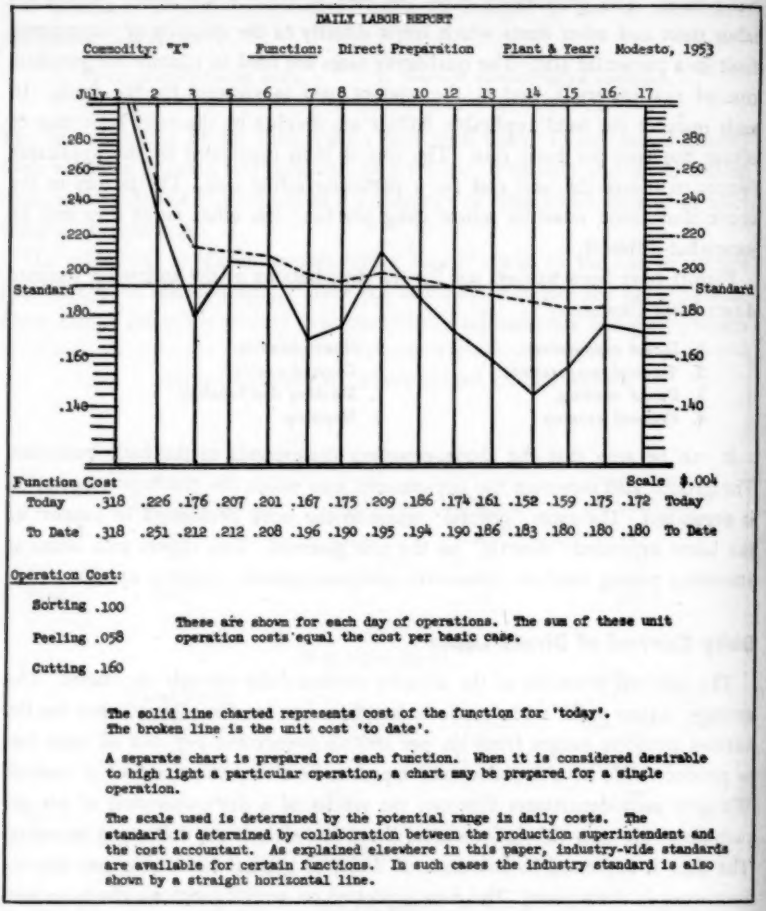

DAILY LABOR REPORT
Commodity: "X"
Function: Direct Preparation
Plant & Year: Modesto, 1953
July 1 2 3 5 6 7 8 9 10 12 13 14 15 16 17
.280
.260
.240
.220
.200
Standard
.180
.160
.140
Function Cost
Scale $.004
Today .318 .226 .176 .207 .201 .167 .175 .209 .186 .174 161 .152 .159 .175 .172 Today
To Date .318 .251 .212 .212 .208 .196 .190 .195 .194 .190 186 .183 .180 .180 .180 To Date
Operation Cost:
Sorting .100
Peeling .058
Cutting .160
These are shown for each day of operations. The sum of these unit operation costs equal the cost per basic case.
The solid line charted represents cost of the function for 'today'.
The broken line is the unit cost 'to date'.
A separate chart is prepared for each function. When it is considered desirable to high light a particular operation, a chart may be prepared for a single operation.
The scale used is determined by the potential range in daily costs. The standard is determined by collaboration between the production superintendent and the cost accountant. As explained elsewhere in this paper, industry-wide standards are available for certain functions. In such cases the industry standard is also shown by a straight horizontal line.

EXHIBIT 2

master. The steps taken to compute the data and plot it on the charts are few and simple. First, a key-sort time card is punched for the numerical code of the operation performed. The code of the corresponding function is also punched into the card. This is done in the plant. Operations as here referred to are the primary recordings of the work done. The functional code groups these into direct preparation, general preparation, etc., as already outlined. The labor cost is then computed and recorded on the time card. These cards are then sorted by operations and posted to ledger cards on a bookkeeping machine.

In posting, the machine accumulates the operations total and dumps them on a functional ledger card. For each functional total, basic cases produced are posted to the ledger card from production records. This is done by hand. Unit costs are computed and recorded on the ledger card. (These ledger cards record other useful data as can be seen from Exhibit 3.) Each day new points are plotted for these unit costs on the pre-printed masters for the daily report. These points are connected with the previous data by straight lines. Six copies are run off and distributed to the foremen and management. We use similar charts to record other production data, such as cases produced from a ton, tons run per hour, etc.

The Situations of Seasonality and Crop Variation

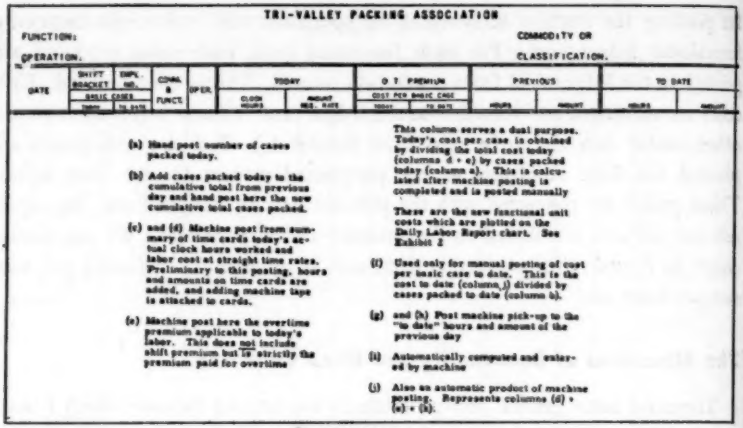
There are some general cost problems in the canning industry which I think are worth mentioning. Seasonality is one. The effect of this on production labor has already been mentioned. One other facet related to seasonality is that increase in mechanization makes supervisory personnel more important. They must be kept on the year around though there is no production.

Variability in the quality and the size of the crop is another perplexing factor. Fruit crops have varied from twenty-five per cent to one hundred and fifty per cent of normal. It must also be remembered that crop results for the entire state or a large region are no barometer of an individual canner's fortune.

As a cooperative we must take whatever our members produce on acreage under contract. However, other canners do not escape this problem entirely. They must take their share of a bumper crop in order to insure themselves a supply in short crop years. The effect of this crop variability on production and distribution is manifold.

Sales Budgeting for Control

Sometimes the term, "sales," as used in the canning industry refers to contracts to ship. In this article the term is used in its more common sense. It means goods shipped to customers. Sales budgeting is ordinarily not considered the responsibility of the cost department. However, in our company the sales budget is prepared by the cost department. It is then reviewed by the sales department and, when accepted, becomes its guide in specific sales planning. This practice rests on this logic. We are a cooperative and, as such, must process each year the harvest of our members. Therefore, the goal of our sales volume is determined by our production rather than market potential. In short, it is our policy to endeavor to move into consumer channels a year's production



TRI-VALLEY PACKING ASSOCIATION

FUNCTION:

OPERATION.

COMMODITY OR CLASSIFICATION.

DATE	SHIFT BRACKET	EMPL. NO.	CONA & FUNCT.	OP'ER.	TODAY		O.T. PREMIUM		PREVIOUS		TO DATE	
	BASIC CASES				CLOCK HOURS	AMOUNT REG. RATE	COST PER BASIC CASE		HOURS	AMOUNT	HOURS	AMOUNT
	TODAY	TO DATE					TODAY	TO DATE				

(a) Hand post number of cases packed today.

(b) Add cases packed today to the cumulative total from previous day and hand post here the new cumulative total cases packed.

(c) and (d) Machine post from summary of time cards today's actual clock hours worked and labor cost at straight time rates. Preliminary to this posting, hours and amounts on time cards are added, and adding machine tape is attached to cards.

(e) Machine post here the overtime premium applicable to today's labor. This does not include shift premium but is strictly the premium paid for overtime

This column serves a dual purpose. Today's cost per case is obtained by dividing the total cost today (columns d + e) by cases packed today (column a). This is calculated after machine posting is completed and is posted manually

These are the new functional unit costs which are plotted on the Daily Labor Report chart. See Exhibit 2

(f) Used only for manual posting of cost per basic case to date. This is the cost to date (column j) divided by cases packed to date (column b).

(g) and (h) Post machine pick-up to the "to date" hours and amount of the previous day

(i) Automatically computed and entered by machine

(j) Also an automatic product of machine posting. Represents columns (d) + (e) + (h).

EXHIBIT 3

every twelve months. The cost and sales departments work together in forecasting the probable composition of a new pack.

The difficulty in programming sales in view of the variability in annual packs has been pointed out. Sales budgeting must cope with this problem. We have developed a technique which I think might be of interest. We prepare a separate sales budget for each product. The budget covers twelve months beginning with the month in which the pack of a particular product starts. This calls for a different budget period for almost every product packed. The quantities budgeted are based on the inventory carried over from the previous budget year at the beginning of the new pack, plus the new pack. For the first month, the new pack is estimated. Usually, by the second month, the total of the new pack is known. Monthly quotas are set. The various products have different characteristics of movement, as disclosed by different monthly peaks in their sales curves. For example, pumpkin shipments are heavy in October and November while peaches usually have their best movement during May.

The budget is prepared in the following manner:

1. The quantities available are determined.
2. The actual cases are converted to basic cases.
3. The quota for the twelve month-period is set by reference to the total crop available.
4. The budget year quota is divided by twelve to get an average month's total.
5. This average month's total is then multiplied by a percentage to obtain the quota for a particular month. The percentage used is determined by reference to the
   (a) historical movement of the products
   (b) the anticipated trend
6. Sales for the previous period and budgeted sales for the new period are then graphed comparatively. This chart is kept up-to-date and published once a month. Each month the new actual sales are plotted on the chart for compari-

MONTHLY REPORT OF CASES SHIPPED TO DATE EXPRESSED AS A PERCENTAGE OF TOTAL BUDGETED SHIPMENTS

COMMODITY X

Size and Grade		Budgeted Cases	July	June	May	Apr	Mar	Feb	Sep	Aug
48/8	Fcy X Hvy	2,230				73%	69%	46%	23%	9%
	Fcy Diet	1,975				89	70	66	9	-
	Cho Hvy	21,730				97	90	79	12	-
24/303	Fcy X Hvy	7,516				71	40	28	4	-
	Fcy Diet	2,047				96	88	71	17	
	Cho Hvy	64,188				84	74	59	17	6
24/2 1/2	Fcy X Hvy	9,799				22	16	12	7	4
	Cho Hvy	41,642				83	79	68	26	5
6/10	Fcy X Hvy	4,129				71	63	49	15	4
	Cho Hvy	45,357				85	82	73	21	2
TOTALS										
% Shipped						80%	73%	61%	18%	4%
% Budgeted			100%	92%	95%	77%	69%	59%	18%	4%
Sales Value -- List						$86.4	$141.8	$62.9	$176.2	$49.0
Sales Value -- Actual						$85.2	$139.9	$61.6	$175.5	$48.1

NOTE: 1. The figures shown in this exhibit are pro forma.
2. Only a few items of Commodity "X" are shown to illustrate actual schedule.
3. The 'Sales Values' are monthly billings. They are shown to the nearest $100. This is a check on the Sales Department which controls the setting of prices.

EXHIBIT 4

son. The data on the chart is in basic cases. This is a true measure of the quantities sold as well as value.

7. An additional schedule (Exhibit 4) is published monthly which shows the results in respect to the shipments of each size and grade, expressed as cumulative percentages of the total budget. In addition, the total sales value is given at list as well as at actual. This usually discloses whether price cuts are necessary in order to move a slow item or, conversely, whether it was possible to obtain better prices than list.
8. A graph showing curves for the cumulative actual and budgeted monthly shipments is also prepared.

These charts and schedules have proven to be valuable tools of control. When an item moves ahead of the budget, the prices can be increased to slow up the movement, if other consideration makes this prudent. If an item is behind the budget, special effort is exerted to bring it in line.

Applicability of Direct Costing to the Canning Industry

In view of the general interest in the debate which pits direct costing against conventional costing, I would like to make a few observations. We are not at the present using direct costing in my company. However, a study is on the way. With respect to the criticism that direct costing makes an arbitrary classification of cost into variable and fixed, we find this unfounded. It can be accepted that every cost has a degree of variability in some frame of reference. The term fixed merely means *less* variability. The difficulty is semantic.

If the terms variable and fixed are not taken in their absolute meaning, the

criterion for their use becomes suitability to the purpose of the cost statements or cost analyses in which they are used. In our company, we classify as variable all costs incurred during the packing season which are directly connected to production. All other costs are classified as fixed. This practice is general in the industry. It is of course understood that, in special analyses, say, of the effect of increased production on fixed cost, a coefficient of correlation might be computed for each component element of the fixed cost. At the present, fixed cost is allocated to unit costs on the basis of total variable cost included in the unit cost. These are then used for the inventory and cost of sales purposes.

Our study has also developed the following:

1. Last year 85 per cent of our total variable cost was incurred during three consecutive months. The fixed costs spread over the entire twelve months with irregular fluctuations by months. This is common for a company of our size.
2. The amount of revenue required in excess of the direct cost to cover fixed costs can easily be determined without actually making the allocation. Different policies and procedures apply to the control of variable and fixed costs. Cost control is better served if these are kept separate throughout.
3. A profit and loss statement prepared under direct costing aids financial management. The relation of the slopes of the accumulated-revenue-in-excess-of-the-direct-cost-curve and the fixed-cost-incurred to date curve in the monthly statements portrays the financial trend. As the profit increases or decreases, the gap widens or narrows.
4. To match fixed cost incurred during the first month of the fiscal year with revenue from inventories carried over instead of revenue from production to be made months later does not becloud the issue. I do not think it prevents the intelligent assessing of operating results.
5. In respect to inventories, after the change-over from conventional to direct costing, the beginning and ending inventories would be stated on the same basis. The inventories would be conservatively stated. For credit purposes, the market value would be considered, as is done under conventional accounting. For tax purposes, an adjustment for fixed cost could be made in the beginning and ending inventories. The data for this would be readily available under direct costing.

In conclusion, I think that direct costing has applicability in the canning industry by reason of these factors. It permits a more ready and direct control of cost. It brings out more clearly the effect of a varying level of production on operating results. It focuses the problem of utilizing plant capacity.

Handling Fringe Costs as Direct Labor

by ALLAN L. RUDELL

Supervisor Factory Accounting, Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

A method of applying so-called fringe labor costs as direct labor requires, first, that such costs be named by categories and, second, that a basis, or bases, of application to direct labor be decided upon. This article illustrates both requirements. Distribution of fringe costs is, in some instances, on direct labor dollars, and, in others, on direct labor hours.

IN ORDER FOR US TO REVISE our accounting methods to handle fringe items as a labor cost, we must first alter a bit our definition of direct labor cost. Accountants have generally thought of direct labor as wages paid to the employees while working directly on the product. We have religiously clocked the workers in and out on each job or operation and have multiplied the elapsed time by the pay rate to get direct labor cost. By this method we have ignored as a labor cost the time spent preparing for work, vacation pay, clean up time, social security taxes and other costs incurred by the employer to keep the workers on the job. Should we not, if our average hourly pay rate is $1.50 and we incur an additional 30¢ per hour for supplementary items, concede our hourly rate is $1.80.

This problem is of considerable significance in companies in which particular attention is given to the changes reflected in direct labor brought about by revisions in design or process of the product. If a proposed change is expressed in a saving of a certain number of hours of direct labor and this saving is to be compared with the cost of tooling, etc., associated with the change, it is not difficult to appreciate the need for a realistic direct labor figure. The solution to the problem to be outlined here, is a method to separate these items from burden and treat them as direct labor. Of course, to account for every penny of "fringe" cost as we do payroll cost would mean unwarranted additional personnel and expense. The solution must be practical and inexpensive.

Fringe Costs and Cost Histories

The first consideration is to determine what we mean by fringe cost. Listed below are some of the items which fall in this category.

1. Holiday pay—Factory employees are paid for certain holidays each year.
2. Vacation pay—Factory employees receive paid vacations.
3. Social security, unemployment taxes.
4. Overtime pay—This is the premium portion or additional half-time paid.
5. Paid lunch period—Employees are sometimes paid for lunch period.

6. Washup time—A washup allowance is sometimes given.
7. Employee welfare or paid personal allowance—This cost includes time spent on credit union activities, community fund drives, time spent reporting to nurse, consulting counsellor, etc.
8. Bonus for night shift—Employees on night shifts are paid an extra premium.
9. Union activities—This item of frnge cost is wages paid to employees engaged in union business including investigating and adjusting of grievances and any other transactions which are a part of the union contracts.
10. Smock laundering and handling and/or safety clothing—The company's share of this item is a fringe item in the sense that the cost is incurred in direct proportion to the number of workers.
11. Social activities (band, glee club, etc.) —The company-sponsored social activities, while minor when compared with payroll, are, I feel, clearly a labor cost and should not be spread as burden.

A second step is to determine the history of fringe costs. If the chart of accounts is complete, we will have good data. While the records may reveal the historical cost complete in total and even separated by principal types of fringes, it will be necessary to express these costs in terms of direct labor personnel payroll or hours. In some cases, fringe cost is properly associated with dollars of direct labor payroll, in others with direct labor hours worked.

A Study of Two Departments

The two top lines of Exhibit 1 show the method for determining the dollar amount of lunch and washup time which applies to the direct labor in two hypothetical departments. The account for lunch and washup itme recorded in burden is the cost not only for direct labor employees but also for service employees, such as those in stores, material handling, etc. A cost of this type increases or decreases on the basis of number of hours worked rather than by a change in payroll dollars. The amount shown in the examples are used to illustrate my method of comparing fringe costs. Other items which vary with hours (employees) are:

1. Employee welfare and services.
2. House organ.
3. Safety and medical department.
4. Suggestion awards.
5. Smock laundering and handling.
6. Company veterans' organization.
7. Union activities.

Other fringe costs are more properly regarded as incurred based on a percentage of payroll dollars. These costs vary as personnel are added and as the wage rates are changed. The lower two lines of Exhibit 1 show how

EXAMPLES OF INDIVIDUAL-CATEGORY FRINGE COST COMPUTATIONS

		Total direct labor hours	Total direct and indirect labor hours	% of Dept. hours spent on direct labor	% of direct labor	Total cost	Portion applicable to direct labor
Lunch and Washup Time	Dept. A	323,000	486,000	66%	-	$27,000.00	18,300.00
	Dept. B	250,000	400,000	63%	-	$ 4,000.00	2,500.00
O. A. B. and unemployment Taxes	Dept. A	$564,000.00	972,000	-	58%	$20,400.00	11,800.00
	Dept. B	$425,000.00	800,000	-	53%	$18,000.00	9,500.00

EXHIBIT 1

this computation is made for old age benefit and unemployment taxes. The dollar amounts experienced in this account by departments applied both to the direct and indirect labor personnel. Holiday and vacation pay can be handled in the same group. Other fringe items which vary with payroll dollars are:

1. Overtime pay.
2. Wage adjustments.
3. Compensation and liability insurance.

Exhibit 2 shows the method for determining all fringe costs. The figures

Applying Fringe Costs as Labor

With this study completed, we are set to face the problem of reflecting fringe costs as part of direct labor in accounting statements, actual cost studies and inventories. We can treat these percentages as a fixed standard for determining fringe as a part of direct labor cost. The mechanics of recording fringe costs using this concept are quite simple. When the direct labor is recorded by departments, the fringe costs can be determined currently by using, to employ the figures developed

DEPARTMENTAL FRINGE COST SUMMARY

Expense	Basis of distribution	Total direct labor hours and/or dollars in dept.	Total direct and indirect labor dollars and/or hours in dept.	% of direct labor to total	Total fringe cost in dept.	Fringe cost applicable to direct labor in dept.
Holiday and vacation pay	Payroll dollars	564,000	972,000	58%	42,600	24,700
O. A. B. and unemployment tax	"	564,000	972,000	58	20,400	11,800
Overtime pay	"	564,000	972,000	58	38,000	22,000
Lunch and Washup	No. of direct employee hrs.	323,000 hrs.	486,000 hrs.	66	27,700	18,300
Employee Welfare	"	323,000 hrs.	486,000 hrs.	66	1,900	1,300
Bonus for Night Shift	No. of direct employees & payroll dollars				36,900	21,400
Other fringe expenses applicable to direct labor (wage adjustment, union activities, etc.)	Both					11,900
	Total					$111,400

EXHIBIT 2

are for Department A. The total cost for this department is $114,400 and the total corresponding direct labor is $564,000, giving a realtionship of fringe to direct labor of 20 per cent. To state it another way, for every dollar of direct labor in Department A, there is spent another 20¢ for fringe costs. If Department B has fringe costs of $62,950 and direct labor of $425,000, a ratio of 15 per cent will result. A complete study would, naturally, go on to all departments.

in the examples given, 20 per cent or 15 per cent of the direct labor. This dollar amount would then be recorded as fringe cost applicable to direct labor, with debit to fringe direct labor and credit to burden.

The fringe items would continue to be booked to the individual burden accounts as they are incurred (for both direct labor and indirect labor) by departments. The credit is an offset to the individual fringe costs recorded in burden. The net effect of this trans-

action is to leave in burden that portion of fringe which applies to the indirect labor plus the fringe cost variance which applies to the direct labor. Having the fringe costs in labor and burden set out in special accounts makes it relatively simple to reconstruct and determine the accuracy of the fringe cost standard. Any fringe cost variances from a standard are not readily apparent by any check of variance accounts. Therefore, to determine a fringe variance a special analysis should be made at regular intervals.

If the inventories are maintained on a standard cost basis, we should also reflect this fringe cost in the standard direct labor. The technique for including fringe in the standard labor would be similar to the accounting method for booking this item. The standard direct labor rate would be computed by using the actual labor rate and correcting for anticipated changes in this rate. The current and anticipated direct labor efficiency should also be considered in establishing this rate. It would then be increased by the appropriate fringe cost allowance percentage. The standard burden is correspondingly reduced by the fringe costs so determined. If the inventories are maintained on a job-cost basis, the fringe costs applicable to direct labor should be reflected in the unit break-down of costs.

In the foregoing paragraphs, I have suggested a method for including fringe costs as a part of direct labor. It is apparent that this method is an expedient one and, as such, has certain limitations. However, I feel that it meets with a practical degree of accuracy, the need for recognizing a truer labor cost.

A Story of Demurrage Cost Control

by McCREADY S. YOUNG

Superintendent of Production Planning, Lone Star Steel Co., Dallas, Texas

How a problem in excess demurrage costs and unsatisfactory traffic flow came to attention, how it was comprehensively investigated, and how it was systematically solved are narrated in the present article. The case background is that of a steel company requiring transportation of pig iron, coal, coke, dolomite and like materials.

DEMURRAGE—THE CHARGE MADE by railroad companies to industrial plants, and others, for holding railroad cars for unloading, or loading, for an excessive period of time—is not ordinarily regarded as a significant item in the total cost of production. However, it may happen that the cost accountant, allocating costs to various departments and cost centers, inadvertently conceals the magnitude of the demurrage charge from management's scrutiny in cases where it does have importance. This possibility was pointed up to us several years ago when the railroad company which delivers to us gave notice of concern over the average "turnaround" on railroad cars delivered to the steel plant. A preliminary study revealed that the monthly demurrage cost for the plant was exceeding $10,000 per month. Immediate action was taken.

Study of Demurrage Causes; Initial Benefits of Investigation

Studies undertaken and completed by the several operating departments indicated that many individual causes contributed to the high demurrage cost. Among these were failure to unload cars in a demurrage status before unloading cars just received, breakdown of unloading equipment, failure to provide notice to the transportation department of the proper point for spotting cars, and lack of definite instructions to plant personnel regarding the requirements of notice to the railroad for pickup of cars emptied and readied for release. Proper training of plant personnel responsible for handling bulk materials corrected most of the problems of which the foregoing were typical. The studies made by the shipping department indicated similar causes resulting in demurrage in the handling of empty cars which were delivered for loading and shipment of finished product. Results of these studies were used to develop specific procedural aims to insure that the known problems would be solved. It was anticipated that problems then unknown would be largely eliminated through the establishment of consistent routines.

Further discussion may be clearer if an indication is given of the materials

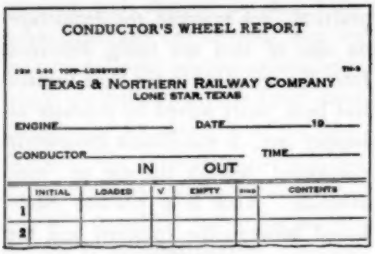
received and shipped by rail. Untreated calcined and sintered ores are each loaded into separate railroad cars which are hauled by the railroad about three miles for delivery to the blast furnace. The production of each day at the mines and beneficiation plant is normally consumed within the following day at the blast furnace. Coal for the coking operation is brought into the plant by rail from mines approximately 250 miles distant. Production and shipment of coal from the mines is scheduled to provide delivery to the plant each day of the required tonnages of coal needed by the coke ovens. It is usually planned to have the coal delivered in hopper cars which dump directly into track bins and are immediately released. The blast furnace, in addition to iron ore and coke, requires quantities of limestone and dolomite for use as fluxing material. This is received in carload lots from quarries approximately 150 miles distant. Here again the material is usually ordered in hopper cars, which dump directly in track bins at the blast furnace for use as required. Outward shipments of pig iron and coke are made in gondola cars which are spotted for loading at the end of a conveyor chain arrangement. The shipping department orders the number of "empties" spotted for shipping in accordance with each day's planned production. Cars loaded with the occasionally produced "off-grade" product are switched to stockpiles for temporary storage if no immediate sale is anticipated.

At the ore mines and beneficiation plant, operations for five days a week can satisfy the ore requirements of the blast furnace for seven day operation. Enough railroad hopper cars are loaded on Wednesday through Friday in excess of those day's actual needs to provide a back-log for use on Saturday and Sunday at the blast furnace and, by Monday morning, many of these cars, prior to this study, were in a demurrage status. Studies of carload receipt of bulk materials revealed that a connecting railroad was grouping cars of coal and other material destined for our plant. The interval between deliveries was dependent upon the receipt of a sufficient number of cars to make up a special train. This practice resulted in days when only a few cars would be received from the regular freight runs, followed by days when the classification yard would be crowded with cars. On days of heavy receipts, the cars received in excess of production requirement would have to be unloaded into stockpiles. On lean days, required materials were of necessity picked up from stockpiles, loaded into cars and switched to the proper spot for unloading. These activities resulted in demurrage costs as well as unnecessary operating costs occasioned by moving material to and from stockpiles.

By invitation, officials of the connecting railroad visited the plant and

observed the problems resulting from car grouping. The practice was stopped. The resulting savings in demurrage and operating cost was quickly noticeable. Working closely with the other plant departments, the shipping department arranged for track storage space adjacent to the loading track. From this track, older cars could be moved for loading ahead of those spotted more recently. Again, significant savings in demurrage expense were noted. These and other practices worked out by the operating departments had a marked effect on the monthly demurrage charges through reduction in average turn-around time.

At this point, the works accounting department brought forth and put into effect the written procedures and other features of the demurrage control program. A basic feature of the demurrage control program was the establishment of a position within the traffic department known as demurrage control clerk. It is the responsibility of this individual to record the arrival at the classification yard of every railroad car coming into the plant site. As the delivering carrier maintains an office adjacent to the plant location, it was arranged to locate the demurrage control clerk in the same office building. This permitted rapid exchange of information and close contact in regard to matters effecting delivery and release of carload lots of materials. His very presence brought relationships closer and made better routines practical. For example, the demurrage on cars of iron ore being delivered from the ore plant to the blast furnace had been partly solved by purchase of hopper cars. It was almost completely eliminated through the use of "run-arounds." This is a practice established between the company and the carrier in their agreement covering demurrage, under which the railroad, in order to avoid excessive switching to secure a car of bulk commodities for delivery to special points, may at its option deliver an accessible car of similar material which requires a minimum of switching. In so doing, the "age" of the "newer" car transfers to the "older" car so that no demurrage results. Material men at the blast furnace were instructed to order specific "foreign" (noncompany) cars of ore from the classification yard by number. They were to order the "oldest" car of desired type of ore first in every case. This would reduce the average "age" of cars awaiting unloading. This practice also applied to limestone, dolomite and other bulk materials used by the blast furnace. Through efforts of the demurrage control clerk, superintendents of other operating departments also soon developed the habit of ordering the oldest cars first. Further, an emphasis upon written record of operating acts was introduced to eliminate the considerable number of mistakes and misunderstandings resulting from the use of telephoned orders for delivery and release of cars. There



CONDUCTOR'S WHEEL REPORT

TEXAS & NORTHERN RAILWAY COMPANY
LONE STAR, TEXAS

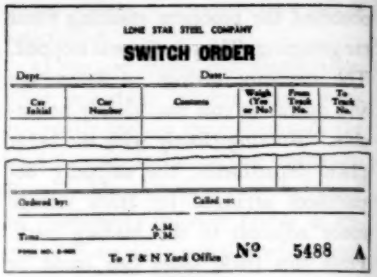
ENGINE _____ DATE _____ 19____

CONDUCTOR _____ TIME _____

IN OUT

	INITIAL	LOADED	V	EMPTY	KIND	CONTENTS
1						
2						

EXHIBIT 1



LONE STAR STEEL COMPANY

SWITCH ORDER

Dept. _____ Date: _____

Car Initial	Car Number	Contents	Weight (Tons or No.)	From Track No.	To Track No.

Ordered by: _____ Called on: _____

Time _____ A.M. P.M.

To T & N Yard Office No. 5488 A

EXHIBIT 2

was installed a switch order form (to be further commented upon) on which each departmental employee responsible for the delivery or release of materials is expected to post the initials and numbers of cars containing materials needed for the production operation. In order to make sure that there would be no delay occasioned by intra-plant mail delivery schedules, each employee was authorized to write up his switch order list and then telephone the information to the yardmaster, giving the yardmaster his name and switch order number and taking, in response, the name of the yardmaster receiving his call. When responsibility for accuracy became a matter of record, errors were sharply reduced.

Three Basic Control Forms

The procedure which has permitted such excellent control of railroad cars within the plant area may best be understood through description of the forms to which significant information is posted and from which the controlling data is secured. The Conductor's Wheel Report (Exhibit 1) supplied daily to the demurrage control clerk provides the initial notice of the receipt of cars at the plant site. This report is prepared by the conductor of each train bringing material into the plant. The original is retained by the railroad company for its records. The words "in" or "out" are circled on the form to indicate the direction in which the train was moving. The car initial is listed in the first column and its number is listed in the column headed "loaded" or "empty" as appropriate. In the column headed "kind" an initial is inserted, such as "B" for box car, "F" for flat car, "G" for gondola, etc. The contents of loaded cars are posted in the final column.

Another key form in accomplishing the demurrage control practice is the Switch Order Form (Exhibit 2). A supply of this form is located at each point in the company's operating departments where men must order materials in carload lots for use in production and subsequently release those cars to the carrier. The form is padded in sets of three. From the list of ma-

terials available in the classification yard, the departmental materials supervisor selects the cars by initial and number which contain materials which his operation will require for that day. As he selects these cars he writes the car initial and number and contents in the column provided on the switch order form, indicates whether or not such cars should be weighed before delivery, and finally, to assist the switching crew, indicates the track number on which the car is loaded and the track number to which the car must be switched.

Upon completing the written switch order and as a means of expediting the switching service and assisting the scheduling work in the transportation department, the materials supervisor telephones his switch order list to the transportation department yardmaster. The original switch order is put in the mail as confirmation of the call. The first carbon copy is put in the mail for the demurrage control clerk and one copy is retained in the department file. The departmental file copy is used as a check list. When the cars which had been ordered to the unloading point have been emptied, another switch order is prepared releasing those cars to the transportation department. The same procedure is followed as has been described. (It should be recognized that the shipping department normally orders empty cars and releases cars loaded and ready for shipment. In this case, however, the release of a car ready for shipment takes place not through a switch order form but an executed bill of lading, which is normal practice with all companies.)

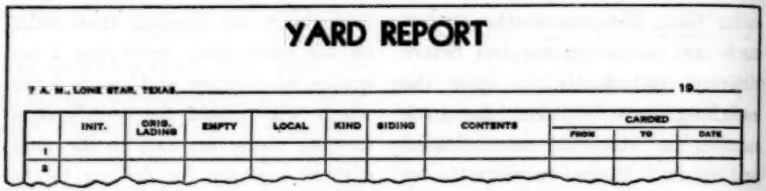
The yardmaster who receives the telephone call from the departmental materials supervisor writes a switch order list of his own. The yardmaster then makes out a switch train order on his conductors, developing a sequence of switches and car pick-ups which will enable the switch train crew to secure the cars in the most efficient sequence for delivery to the desired unloading tracks. He may, at this time, determine the "run-arounds" that may be required to simplify the switching crews' work.

Another report of great value in the control of demurrage is the Yard report (Exhibit 3). This report is prepared jointly by employees of the railroad which is the delivering carrier and the company's transportation department. The report is a listing of all cars located within the plant area at 7:00 a.m. of the particular date, the significant time in the determination of demurrage status. As this report has use in many locations, it is prepared for duplication and a number of copies are prepared. The yard report is utilized by departmental materials supervisors in determining the cars of materials required by their operation which are available for unloading during the day. It also serves as a control to insure that the conductor's wheel report which identifies carloads of ma-

terial brought into the plant has correctly stated the car initial and number.

The Control Clerk's Records: Demurrage Computation

The three forms which have been discussed all contribute toward the control of demurrage as well as efficient operation within the plant. The copies of each of these forms which reach the demurrage control clerk provide information which permits him to know constantly the status of any car from the time it is received within the plant until it is outbound in the hands of the railroad company. From them he obtains information for posting to the form which serves as the backbone of the demurrage control program, known as Record of Cars Handled under Average Agreement (Exhibit 4). This combines the ideas and experience of a number of people in the company's transportation and traffic departments and it also has features developed by experience gained through the operation of the demurrage control program.

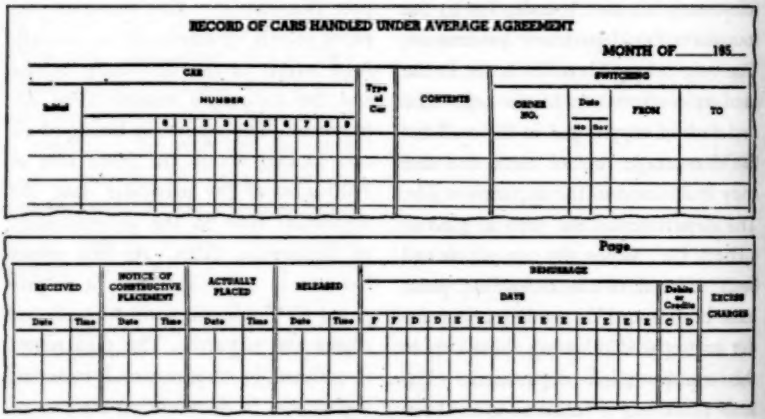


YARD REPORT

T. A. M., LONE STAR, TEXAS _____ 19____

	INIT.	ORIG. LADING	EMPTY	LOCAL	KIND	SIDING	CONTENTS	CARDED FROM	CARDED TO	CARDED DATE
1										
2										

EXHIBIT 3



RECORD OF CARS HANDLED UNDER AVERAGE AGREEMENT

MONTH OF_____195__

CAR Initial	CAR Number	Type of Car	CONTENTS	SWITCHING Owner No.	SWITCHING Date mo.	SWITCHING Date Day	SWITCHING FROM	SWITCHING TO

Page_____

RECEIVED Date	RECEIVED Time	NOTICE OF CONSTRUCTIVE PLACEMENT Date	NOTICE OF CONSTRUCTIVE PLACEMENT Time	ACTUALLY PLACED Date	ACTUALLY PLACED Time	RELEASED Date	RELEASED Time	DEMURRAGE DATE F	F	D	D	E	E	E	E	E	E	E	E	E	E	Debits or Credits C	Debits or Credits D	EXCESS CHARGES

EXHIBIT 4

Upon receipt of the conductor's wheel report listing the cars on in-

bound trains, the demurrage control clerk posts all useful information concerning the cars in columns provided on the record form. Initial and car number are the first items posted. It should be noted that the car number is not written in full. Rather, the last digit of the number is merely checked in the column provided. Through this device the demurrage control clerk can run quickly through the twenty to thirty active pages and locate any given car in a minimum of time. The type of car is indicated by an initial. The contents of cars delivered are abbreviated whenever possible. As the majority of shipments received at the plant are bulk materials (coal, ore, limestone, etc.) which are identical day after day, no problem is encountered by abbreviation. (During the course of plant expansion when many construction materials were delivered, it was frequently necessary to post complete descriptions in this column.) In the section of the form headed "switching", the switch order number is posted from the copy of the switch orders sent by mail to the demurrage control clerk by the various departmental materials supervisors. In the columns headed "from" and "to" are posted the applicable track numbers.

The date and time that each car is received is posted from the conductor's wheel report and, thus, usually, will be posted before a switch order. The purpose for locating this column at this point is to provide a quick comparison with the column in which the date and time released is posted. The time of release is posted from a switch order form or from bills of lading as previously described. From the record of cars handled and the daily yard report, the demurrage control clerk prepares daily a list of cars by car initial, number, kind and contents which are approaching a demurrage status and to which the affected departments should give immediate attention. This feature has had the salutory effect anticipated when started as a planned part of the demurrage control procedure.

Results with a Capital "R"

The inter-relationship of the forms devised and the cooperation of all departments and individuals concerned with carload receipts of shipments have contributed to the early smooth operation of the demurrage control plan and its continuing success. Examples of reports issued daily and monthly are shown in Exhibit 5. The program was instituted during a period when plant activity was at a high level. Approximately one year later, the company entered a major expansion program, involving the construction of facilities more than doubling the size of the existing plant. The control of demurrage on carloads of material entering the plant site for construction purposes was added to the demurrage control clerk's job. While the constant cooperation of all concerned was a basic factor, much credit

TYPICAL REPORTS

Daily Demurrage Report

TO: All Operating Department Superintendents

FROM: Demurrage Control Clerk

Car Initial	Car Number	Type	Contents	Demurrage Begins 7:00 A. M.	Excess Charge
RI	188528	Gon	Limestone	Friday the 19th	$10.00
RI	187308	Gon	Limestone	Friday the 19th	10.00
CO	12679	Box	Fittings	Thursday the 18th	20.00
CBQ	34913	Box		Wednesday the 24th	None

Monthly Demurrage Report

TO: Vice President - Operations

FROM: Demurrage Control Clerk

During the month, demurrage accrued in the amount of seven hundred and ninety-two dollars ($792.00).

Inbound	
5 Cars Scrap	$108.00
15 Cars Open Hearth Ore	192.00
8 Cars Open Hearth Limestone	132.00
1 Car Ferro-Silicon	12.00
7 Cars Coal	42.00
2 Cars Blast Furnace Ore	24.00
Total	$510.00
Outbound	
8 Cars Pig Iron	$132.00
1 Car Sulphate	6.00
3 Cars Furnace Coke	60.00
3 Cars E. W. Pipe	24.00
5 Cars Ingots	60.00
Total	$282.00
Grand Total	$792.00

Following is a break down by departments where demurrage should be charged.

Open Hearth:	
5 Cars Scrap	$108.00
15 Cars Ore	192.00
8 Cars Limestone	132.00
1 Car Ferro-Silicon	12.00
	$444.00
Coke Oven:	
7 Cars Ore	$ 42.00
3 Cars Furnace Coke	60.00
	$102.00
Blast Furnace:	
2 Cars Ore	$24.00
	$24.00
By Products:	
1 Car Sulphate	$ 6.00
	$ 6.00
Shipping:	
8 Cars Pig Iron	$132.00
3 Cars E. W. Pipe	24.00
5 Cars Ingots	60.00
	$216.00
Grand Total	$792.00

One hundred and eight dollars accrued on five cars of scrap. These were cars that could not be unloaded before this amount had accrued.

One hundred and ninety-two dollars accrued on fifteen cars of ore for the open hearth. The cars were spotted in ample time but too many cars were in the yard at the same time.

One hundred and thirty-two dollars accrued on eight cars of limestone for the open hearth. Some of these cars were used in inter-plant service after being unloaded which caused this amount to accrue.

Twelve dollars on one car of Ferro-silicon. This car was spotted in plenty of time but was not unloaded.

Forty two dollars accrued on seven cars of coal. These cars were also used in inter-plant service to load coal from stock.

twenty four dollars accrued on two cars of ore for the blast furnace. These were cars in which no run-arounds could be applied.

Sixty dollars accrued on three cars of furnace coke. These cars were not loaded in time and released to the shipping department for billing.

Six dollars on one car of sulphate. This car was loaded in time but had to be brought back for adjustment.

One hundred and thirty-two dollars accrued on eight cars of pig iron. Too many empties in the yard at the same time. These could not be loaded before this amount had accrued.

Twenty four dollars on three cars of e. w. pipe. Cars were spotted in time but were not loaded.

Sixty dollars accrued on five cars of ingots. These cars were used in pig iron service and already had demurrage before being spotted for ingot loading.

Chief Clerk _____

EXHIBIT 5

must also be given to the simplicity of the demurrage control program itself, which enabled the one clerk to handle demurrage control on operations and construction, with no additional help.

A good measure of the success of the demurrage control program during the period when both operations and construction activities were being serviced through the one office, is the amount of demurrage paid to the delivering carrier. The average monthly demurrage paid by operations during the two years of peak construction activities was approximately $200 a month. Several months had no demurrage and none exceeded $1,000. At the same time, with more than 5,000 carloads of construction materials entering the job site, the general contractor paid total demurrage of less than $1,000. While recent organizational changes resulting from greatly enlarged production facilities have somewhat changed the handling of carload materials, demurrage expense has been held to a relative minor position in the total cost of company activities.

Charging Maintenance Costs In A Large Organization

by ROBERT E. RAYNER

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The step-by-step procedures which are followed for the recording and charging of maintenance costs in an organization in which the maintenance department is parent-company operated and machinery in service has widely varying maintenance characteristics is here presented, with related reporting forms.

THE ACCUMULATION of maintenance costs for the small business with only one plant and its own maintenance department is comparatively simple. However, when we are concerned with an organization which consists of a parent company and several divisions or subsidiary companies at one location, we must look for a means of charging maintenance cost properly. This is most certainly true when the parent company operates the maintenance department. A further complication is brought about in the case at hand, because of certain specialized machinery that the company owns. Outside concerns send in material for processing, such as the sharpening of flat-bed cutter knives. It is with this type of organization that the present paper is concerned, although single-plant companies may also be interested in the procedure. A point which may be made at the start is

that in an organization of the size under consideration, we can almost always find a mechanized tabulating department. Its services are made use of for maintenance accounting.

In presenting the system here described several assumptions have been made. Labor is assumed to be required in total not only on the job but it is coded as to type, i.e., electricians, carpenters, machinists, etc. The description of items used from stock is not elaborate and merely identifies them as material from stock. Description of major items, especially on capital jobs, is to be in sufficient detail to provide identification for the property ledger. The inventory account for maintenance materials is used as a clearing account for all outside purchases charged directly to jobs. As these will clear within each period, there is no danger of overstating the value of the inventory. It is further assumed that we are going to voucher the charges only once during the period. Expense jobs will close out each period to the proper account and capital jobs will remain in a construction in progress account and will close to the fixed asset account when completed. A method of identifying the type of maintenance work performed is desired and the system is set up to show charges to repair of buildings, machinery, office equipment and other classifications of items.

REPORT OF NEW MAINTENANCE JOBS AUTHORIZED

TO: Tabulating Division Date .....

Add the following maintenance jobs to your master file of jobs. Charge costs as indicated.

JOB TITLE	JOB NUMBER	CHARGE COST CENTER	CHARGE ACCOUNT
Repairs and Maintenance Buildings Cost Center 109	21009	109	
Repairs and Maintenance Machinery Cost Center 104	22004	104	
Install air conditioner in President's office	41068		1710
Overhaul Press #3 Contract of Rathburn & Bird all costs	42106		1715

EXHIBIT 1

Job Numbers—A Language

It is also presupposed that a system of job numbers has been set up in accordance with requirements, employing two series of numbers, one for the reoccuring jobs performed each period and another to cover those jobs which, of necessity, must be special in nature and can be considered as nonrecurring. For our purposes a five-digit series of numbers is used. The first digit identifies the jobs within the two classes referred to above. We

shall assume that jobs in a 20,000 series are those which repeat each period and that a 40,000 series is used for the special jobs. A chart of accounts, in which the last digit of the account number for labor distribution has the same meaning as the last digit of the account number for material charges is likewise assumed. Thus, within the labor group 161 indicates buildings, 162 machinery, 163 office equipment, etc. and, within the material group, 261, 262, 263 would relate to the same assets. This digit is used, again with the same meaning, in the job number series. We now have job number classified series of 21000, 22000, 23000 and 41000, 42000 and 43000.

The last three digits of the job number series remain to be utilized. Permanent numbers can be set up for repetitive sales. If the cost centers are in a numerical sequence, such as 101, 102, 103, we can control on the last three digits of these numbers, sorting through the last digit. This number would then become the fifth, fourth and third digit of our permanent job number series. Thus Job Number 22001 would indicate work on machinery in Cost Center 101 and Job Number 23015 would indicate repairs to office equipment in Cost Center 115.

With jobs of a special nature, a slightly different setup is required. These job numbers run in numerical order within each group to (40)999. The series then reverts to the first number and starts from (40)001 again. Thus, a job numbered 42150 would indicate a special job calling for an out-of-the-ordinary repair on machinery. The procedure for the charge on such jobs is now to be described.

Getting The Job Cards Ready

The request for maintenance work is the first procedural item in the program. Any type of request can be used. Ours is a simple written form with space for description of job, signature of person requesting the work, approval by the department head and any other required signature. The form is completed in triplicate. After approval, the original copy is forwarded to the maintenance department, the duplicate to the costing unit or other division responsible for accumulating costs, and the triplicate is returned to the originating cost center. The maintenance department assigns the job number.

Upon receipt in the costing unit of the controllers department, the approved request is reviewed to determine classification of the job as regards expense items and capital charges. On all expense items, the cost center to be charged is indicated and on capital items the particular capital account is determined. All new requests with the pertinent account number indicated, are then forwarded to the tabulating division, accompanied by the report shown in Exhibit 1. In

some cases it may be desired to show the job title on the tabulating run. This can be accomplished with the use of a "MLP" (multiple line printing) tabulating card. The use of this type card will permit the listing of a job title of up to 72 characters and spaces, printing in three lines of 24 characters each. Longer titles can be printed by using additional "MLP" cards. The tabulating division maintains a master file of all authorized jobs. Each day the various charges to individual jobs are checked against the master file and any discrepancies are noted at that time and adjustments made, in order to prepare for an immediate run at the end of the period.

REPORT OF MATERIAL USED ON MAINTENANCE JOBS

TO: Tabulating Division Date .....

Add maintenance materials to jobs as indicated.

JOB NUMBER	DESCRIPTION	AMOUNT
21006	Materials from Stock	26.39
22019	Materials from Stock	10.24
41058	Materials Pittsburgh Paint PO 34269	56.78

EXHIBIT 2

Reporting Charges to Maintenance

Each maintenance employee reports the actual number of hours worked on each job for the day on a daily time ticket other than the time clock card. This ticket is forwarded to the tabulating division and the number of hours reported on each job is extended by the department rate per hour and the amount charged to the job. Because of a difference in hourly rates, it was found advisable to fix separate department costs per hour for electricians, machinists, and carpenters. Our usual procedure has been to find the average hourly wage within each group and to add a percentage of supervision, clerical, and department expenses and supplies. Material items of a general nature, such as wire, elbows, conduit, etc. are purchased in quantity and charged to an inventory of maintenance materials. The usage of these items is reported each day by job number by the maintenance department and the quantity used is priced at current rate per item as determined at the time of the last purchase. These extended reports are then forwarded to the tabulating division. Here a card is punched with the description "material from stock" and the amount charged to each job number.

For certain major jobs, it is necessary to purchase items specifically, obtain the services of outside labor, and, in some instances, put the whole job out under contract. Items such as this are all channeled through the person responsible for the control of the maintenance work. All invoices for such

items are charged into maintenance inventory account and are listed in sufficient detail on a report form and sent to the tabulating department (Exhibit 2). In such cases the tabulating division will usually show more detail as to items of material such as an abbreviation of the vendor's name, the purchase order number, and brief description of the item purchased.

A control sheet is made up each period showing the type and amount of materials used and is forwarded to the tabulating division for processing. It is posted daily. At the end of a working period, the total of material charges to the jobs must agree with the control. In this manner, the inventory is kept in line, with one entry for the total of all items used from stock. The remainder of the material used will zero out the period's charges to the inventory account already mentioned.

Summary Listings and Vouchering

The processes described up to this point are carried on daily throughout the period as determined by the particular company involved and its needs. At the end of this time, it is necessary for the tabulating division to provide a summary listing of all labor and materials charged to each job during the period. All of the information is sorted by job number and the primary run (Exhibit 3) is made in job number order with minor totals on each job for straight time labor, department labor, materials, and total job. A major total is taken at the end of the run and the subsequent cost breakdowns must agree with these totals.

After the first run is completed a

MAINTENANCE COST REPORT — PERIOD 195

DESCRIPTION	JOB NUMBER	DEPT. OR C.C. NO.		ACTUAL HR. TIME PAYROLL	PREVIOUS BALANCE	ADD. OR LABOR COST	MATERIAL COSTS	TOTAL JOB COSTS ▼	REMARKS
REPAIRS AND MAINTENANCE BLDGS. COST CENTER 115 MTL. FROM STOCK LABOR	21015 21015 21015	115	/	139 40		167 43	25 72	25 72 / 167 43	
MTL. TO 24946 SHEF. SUPPLY MTL. TO 24970 PITTSBURGH DR. MTL. TO 25019 ATKINS CO. MTL. TO 25020 ATKINS CO. LABOR	43/95 43/95 43/95 43/95 43/95		/	246 50	975 80	296 00	13 50 1 50 340 00 100 00 44 75 00	13 50 1 50 340 00 100 00 296 00 511 40 *	
(1) PRIMARY RUN TOTALS (2) All succeeding runs must agree with these figures	blank		(1)	144 95	(1) 975 80	(1) 488 71	(1) 494 21	(1) 1470 16	
Second Run — Sorted on 2nd digit of job number.	-1--- -3---		(2) (2) (3)	145 38 244 00 114 38	975 80	(4) 192 61 (5) 302 10 (6) 488 71	(2) 36 46 (3) 457 75 (4) 672 65	220 26 511 40 1392 16	
(2) Charge accounts 1&3 (3) Credit Undistributed Payroll (4) Take up from previous journal (5) Not used without them adding 1&3 (6) Charge 1&3 & 2&3 (7) Credit Maintenance Inventory	job total account								
Third Run — Sorted on Account or Cost Center Then last digit		103 115 1960						(8) 16 10 (9) 220 26 (10) 511 40 (10) 1392 16	
(8) Charge Cost Centers 103 & 115 (9) If job closes charge capital If job remains open total becomes (10) Credit Maintenance Department	account 1960	previous		balance	to next period				

EXHIBIT 3

sort is made on the second digit of the job number and a summarized total is made on each number. This gives a distribution of straight time labor and of material. A second sort is made on the account number and a summary total of the job totals is made for each account number. These totals then become the basis for vouchering. The resulting credit for the labor distribution is to the undistributed or accrued labor account and the material credit is to inventory.

The tabulating run is made on four-part paper and its distribution is to the vouchering unit, the plant accountant and the maintenance department. The fourth copy is either discarded or sent to some other person desiring the information. The copy for vouchering unit is, in our case, filed as a permanent record in the cost unit. The plant accountant uses the information shown by the jobs charged to capital accounts to build up the complete cost on a job from the various periods in which work is done. In this way, the complete cost of the job is assured of getting into fixed assets. There need be no fears of missing some costs. The maintenance department copy is used by the maintenance engineer as an aid in estimates on future jobs and affords a means of comparing actual costs with the estimates which were provided on each at the time of authorization.

At the end of each period, it is necessary to notify the tabulating division of the job numbers of those still open. This is required, in order that the division can set up the transfer of a previous balance on a job, to start out the run at the end of the next working period. Because the expense jobs are closed in total every period, this information is needed only on jobs chargeable to capital accounts, which are still in progress.

Because of the flexibility inherent in a tabulating system, the cards can be retained and used for other items. In one company I know, a sort is made of all jobs performed during the year. The totals then are used in projecting a budget of maintenance costs for the coming year. They are also used in distributing overhead charges for maintenance work which could not be charged to a specific cost center.

A Proposed Treatment of Packing and Shipping Costs

by JOSEPH F. SCHAEFER

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Touching first on the composite nature, functionally speaking, of packing and related costs, the author of this paper passes on to the contention that these costs can practicably be related to products for the purpose of deferring or charging them off for profit determination. He favors carrying them to expense in proportion to product sales and deferring the remainder in a special account for packing and storage.

The accounting treatment of packing and shipping costs is a subject that has been strangely neglected in the past. A very good indication of the importance of packing and shipping costs in the automotive parts industry is the fact that these costs represent 10 per cent of the total cost of some product lines. It is much higher in many industries. A boost to packing costs came into being as greater geographic areas were covered, with a consequent increase in transportation costs. Another influence is that where products are "chosen" by the customer rather than being directly "sold" to him, the role of packing changes, for, then, the package must not only protect the product but perform a selling function as well.

For example, passenger car shock absorbers made for sale to consumers as replacement parts are generally enclosed in cardboard boxes printed in several colors. Dealers would strenuously object to the manufacturer shipping these shock absorbers in bulk like bananas. A portion of the cost of the box might therefore be classified as a cost of production. The cost of the box, then, is theoretically divisible into the cost of producing a salable product and the cost of selling the product. The fundamental problem is to properly assign to revenue these normally unsegregated costs.

Functional and Accounting Identity of Packing and Shipping Costs

In more particular, the functions of packaging are to protect the product, to facilitate the handling and use of the product, to identify the product, to identify the maker of the product, and to help sell the product. The nature of the product and the type of customer to whom it will be sold—whether to manufacturers, dealers or consumers—will determine the relative importance of the above functions in selecting the packaging for a product. In shipping a large quantity of shock absorbers to an automobile manufacturer, for instance, the basic uses of the packaging are to protect the product during transit and to make

the handling of the product less burdensome. The identification of the product and the manufacturer are accomplished simply. But, in shipping a set of replacement shock absorbers to a distributor for eventual sale to a car owner, protection of the product becomes a minimum requirement and the selling function becomes the most important part of the packaging's work.

The foregoing discussion of the functions of packaging may help in clarifying the selection of the appropriate cost categories for charging costs represented by a package, such as a box. Let us assume that a box used to enclose a single replacement shock absorber costs five cents. The box protects the shock absorber during shipment to the customer. The cost of this protection, an unknown portion of the five cents, is clearly a shipping expense, incurred in placing the product in the buyer's hands. The same box also aids the dealer buying the shock absorber for re-sale. It enables him to stack the shock absorber neatly on his shelf, to protect it from dirt and grime, and to readily identify the model and year of the passenger car using the shock absorber. The product could not be sold if the box did not perform these functions. Therefore, another portion of the five cent cost is a cost of producing a saleable product. Identification of the manufacturer and the product (and beyond this, the effort expended in making the box attractive) may be considered, similarly, advertising expense. For it not only promotes the sale of the product on the shelf, but the sale of future products as well. The accounting problem is to charge these diverse service expirations to the operations of the period in which they create revenue.

Packing costs in the automotive parts industry include the purchase price of such elements as pallets, boxes, cartons, drums, cans, and bottles, labels and paper, banding wire, clips, seals, and tapes, instruction booklets and other material necessary for protecting a product and describing its contents and uses to prospective buyers. These costs are easily segregated and classified. More difficulty is encountered with the labor costs of packaging the product but, with the help of time studies, these costs may also be segregated and classified. Direct departmental charges for depreciation of special packaging machinery or for supervisory services, are less easily traceable to product grouping, individual orders, etc. The final group of costs are those that cannot be allocated directly, such as heat, light, general maintenance, property taxes, etc. Shipping costs include all the costs, both direct and indirect, of separate shipping operations. The costs include outside services such as transportation of the product, its storage, and the insurance and other special charges.

Theory Underlying the Proposal

An examination of the accounting theory behind the method to be suggested for handling packing and shipping costs will show what ends are sought by use of this method and that these ends are compatible with generally accepted accounting principles. The costs of most business enterprises can be classified into two general functions, i.e., production and distribution. (Additional functions of finance and administration have been suggested, but these are really subdivisions of the production and distribution functions.)

Production costs are those necessary to make a product or perform a service. They include all costs of altering the form of the product to the point at which it is saleable. The general accounting treatment of production costs has been to assign them to units of the product and to charge them to an inventory account. When a unit of product is sold, the cost is transferred out of the inventory account and included as a cost of operation. The cost is matched with the revenue received from the sale to determine whether a profit or loss has resulted.

Distribution costs include all those costs incurred in storing, selling, and transporting the product. In most cases, this will constitute the cost of all activity performed after the productive process has ceased. Quite a few categories of distribution costs, such as advertising and salesmen's salaries, are very difficult to trace to units of product. Hence, here the accountant has generally found the job too difficult or too expensive and, lacking methods supported by objective evidence, he has charged these costs expediently to the operations of the period in which the cost was incurred.

Nevertheless, accountants have been devoting more and more effort to the problem of discovering methods of relating distribution costs to revenue. Where a relationship is clearly established, as in the case of packing and shipping costs, the distribution cost may be deferred until the related revenue is realized. This is the present recommendation. It is practical because packing and shipping costs can be traced to units packed and sold, without great difficulty. If the cost of packing a unit is known, then this cost may be deferred until the unit is sold. This is true even though some portion of the packing cost is a cost of production while the remainder is a cost of distribution. The problem is then reduced to determining the cost of packing and shipping each unit of product.

Application of the Method

Determination of the packing cost of each unit of product will be discussed first. The costs may be classified by the usual elements of direct material, direct labor, and overhead. The direct material costs are easily related to individual units of product by the use of bills of material for each type

of product shipped. Each bill of material will list the carton, box, or pallet, the banding, labels, instruction sheets and all other material included in the packaging of a particular shipment. The material is then priced from cost records and the material cost of packaging a unit easily established.

The problem of relating labor costs to units packaged is best approached by the use of standards for each operation, established by time studies. The standard hours developed to package a unit is then multiplied by the labor rates for the department to establish the labor cost of packaging the unit. An additional advantage of using standard times for each packaging operation is that efficiency variations can be developed which will prove helpful in controlling costs.

Overhead costs for the packing department are handled much the same as they are in production departments. Some types of costs will show a direct relationship to operations in the packing department and will be charged directly to it. These may include direct supervisory efforts, maintenance and repair of machinery in the department, and the maintenance of the departmental area. Other types of costs must be allocated to the department on an equitable basis. These costs, where the relationship to operations in the department is not clearly apparent, will include such items as heat, light, property taxes, and many others. The total overhead costs of the packing department are related to the units packaged by use of a base of direct labor dollars or direct labor hours.

The material, labor, and overhead cost of the units packaged during a period (and the cost of unused purchased packing material) are then charged to an account called deferred packing cost. This account is supported by a detailed classification of these costs as they were assigned to units of product packaged during the period. When the units are sold, the attached packing costs are credited to the deferred packing cost and charged to the packing cost account, to be closed out to the profit and loss account. In essence, these costs are treated much the same as costs channelled through inventory accounts.

As was mentioned earlier, some portion of the cost of a box or label may be intended to help in future sales of the company's products. This cost would not be applicable to the unit of product enclosed by the box or label, but should be matched against the revenue from future sales of the product. However, the difficulty of distinguishing the amount of the cost of a box or label pertaining to these future sales and the difficulty of discovering the amount of sales made possible by this expenditure, make it necessary to assume that the entire cost of the box or label applies to the unit enclosed.

By this method, all the costs of maintaining a shipping department

(including all direct and allocated charges) and all costs of transporting the product to the customer, may be charged to selling expense in the period that the shipment takes place. Revenue is usually recognized when acceptance of the product by the customer is assured. The shipping date is generally close enough to the acceptance date to assume that they occur almost simultaneously. Thus, the revenue from the sale of units of product is assumed to be realized in the same period in which expenditures for shipping the units are made.

Storage costs may also be deferred until the product being stored is sold. Relating storage costs to individual units of product is accomplished first by accumulating the costs of the storage functions. They are then allocated to units of product on some reasonable basis such as space occupied. These costs are then carried in a deferred storage cost account until the units are sold, when they are transferred to the storage cost account. However, when the manufacturing cost of a unit in storage plus the packaging cost and the storage cost equal the expected sales price of the article, any further storage costs applicable to the unit should be immediately charged to operations. The loss expected on the sale is thus recognized as soon as possible.

This entire method will, of course, require more detailed record-keeping than is usual with respect to these costs and will, perhaps, be more expensive than other means of recording packing and shipping costs. However, the addtional clerical cost can more than justify itself through savings possible from the additional control of costs. Principally, though, the method aims at presenting to management a more accurate periodic profit or loss computation.

Better Profit Reporting and Cost Control

There will be little disagreement with the statement that, when packing and shipping costs are shown as costs of operations in the period in which the money was spent, serious distortions of profit or loss may occur. As an example, large quantities of packaging material may be purchased to gain quantity discounts or for other reasons. Obviously, it is incorrect to report the cost of these purchases as a cost of operations of a single accounting period. By relating the packaging costs to units of product and deferring them until the unit is sold, as here suggested, profit or loss is more accurately measured.

A valuable by-product of the classification and analysis involved in applying this method is the closer control which can be achieved over packing and shipping costs. Of course, under other circumstances, the total costs may be compared with the totals of previous periods. However, this method suffers from the forced assumption

that the previous period's costs were right and reasonable. Another method is to compare the total costs with an amount budgeted for this purpose, but budgeted costs too often consist of educated guesses based on many assumptions as to the trends of the economy and the plans of the company. All of these must be examined as to their validity if the comparison is to prove meaningful. Under these methods of comparison, adjustments must be made for differences in the volume of operations underlying both present costs and those of previous periods or those upon which budget estimates were made. The comparison of unit packaging costs with established standards will prove a more fruitful method of cost control. And, if they can be related to individual units of product, the impact of increases or decreases in packing or storage costs is presented in a manner more easily grasped.

Summary of the Ground Covered

Distribution costs and their accounting treatment present one of the accounting profession's most serious challenges. The problem of matching these costs with the appropriate revenue is complicated by the great variety of costs present, all with greatly different characteristics. The solution to the problem must begin with the proper classification of these costs into groups displaying like characteristics. Then, each group must be studied and analyzed to determine an objective, logical method of matching them with revenue.

In this paper a method of classifying, analyzing and charging off packing and shipping costs has been suggested, in the hope that a more accurate and meaningful profit or loss figure might be computed. This method consists of tracing these costs as accurately as possible to units of product. The costs are then held in suspense until the units are sold.

Letters to the Editor

FULL COSTS KEEP INVENTORY VALUES COMPARABLE AMONG PLANTS

Editor, N.A.C.A. Bulletin:

A LETTER PUBLISHED at this season a year ago (J. L. Kavanagh, "What Costs Shall Be Excluded From Inventory Values?" October 1953 *N.A.C.A. Bulletin,*) discussed the omitting of fixed charges from inventory valuation. An enumeration of the advantages of the omission of fixed charges included the following:

"Distortion of inventory values as between similar products produced in different plants would be eliminated. A product produced at a new plant with high-tax value and full depreciation would still be comparable to a product manufactured in an older low-tax value fully depreciated establishment. Any change in value would result from efficiency of production."

In case readers failed to detect an inconsistency which seems to me to exist in the argument advanced, this letter may serve a useful purpose by pointing it out. It seems to me that costing inventory without including fixed charges would exaggerate rather than eliminate any "distortion of inventory values as between similar product produced in different plants." In a well-managed business, a "new plant with high-tax value and full depreciation" is almost certainly a plant which employs labor-saving equipment to the greatest possible extent. It should also be located in an area where labor rates per hour are lower or where materials are procurable at lower cost.

The result, of course, is that direct labor and material unit costs are relatively low for products manufactured in a new plant. The lower direct costs per unit offset, in part at least, higher fixed burden charges per unit such as depreciation and property taxes. Conversely, an old plant is likely to have a relatively high direct labor cost and, perhaps, higher material costs as well. These higher direct costs are offset by lower fixed charges for taxes and depreciation.

That being the case, the exclusion of fixed charges would not eliminate distortion of inventory values as between similar product produced in different plants. On the contrary, the distortion would be exaggerated. The fact is that the inclusion of the fixed charges in inventory values tends to equalize total costs as between new and old plants producing similar products.

What is more, the total cost including fixed charges seems to me to be the cost which should appear in reports to management. Data used by management to compare costs between plants would be misleading if it omitted fixed charges. The cost accountant would have some difficult explanations to make if the lower unit costs for the new plant reported to management (on a direct costing basis) should turn out to produce lower profits.

GEORGE H. KRUECK Jr., *Milwaukee Chapter*

TWO POINTS ON CONTRACT TERMINATION

Editor, N.A.C.A. Bulletin:

I READ WITH A GREAT DEAL of interest Mr. Martin J. Crean's article on the subject of "Processing the Termination Claim," in the May 1954 issue of the *N.A.C.A. Bulletin.* The information is well presented and should be very helpful to a firm facing termination for the first time. However, as one who participated in the drafting of Section VIII of the Armed Services Procurement Regulation and Chapter V of the Contract Audit Manual, I believe Mr. Crean made two statements that might well be amplified.

Mr. Crean states: "There are four cost accounting methods which may be employed by a company as a basis for preparing a termination claim. They are the inventory basis, total cost basis, percentage of completion basis, and any other reasonable basis."

As a matter of fact, ASPR 8-503.2 lists only three bases for settlement proposals:

(a) inventory basis "* * * will be generally preferred."

(b) Total cost basis "* * * provided its use is approved by the contracting officer."

(c) Other bases, "Termination claims will not be submitted on any basis other than (a) or (b) above without the prior approval of the secretary of the department concerned or his duly designated representative."

A little later in his article, Mr. Crean states:

"Finished products, as of date of termination, are either shipped out with approval of contracting officer and billed at sales price, or included in the settlement proposal as acceptable finished products. If the latter, they are priced at sales price."

The comment from CAM-5-4.307 might well be added:

"If the contract requires crating or delivery at a specified point, the auditor should determine that the price to the Government has been adjusted to reflect the savings in cost of crating, cartage, and freight, which the contractor would have incurred if delivery had been required."

FOSTER E. HALL, *Washington Chapter*

LEARNING CURVE AFFECTS MANY COST CATEGORIES

Editor, N.A.C.A. Bulletin:

A VALUABLE ARTICLE was carried in the December 1953 *N.A.C.A. Bulletin* ("Learning Curve Helps Figure Profits, Control Costs" by Rolfe Wyer) on learning curves and their use in determining monthly gross profits and in controlling direct labor. This article pointed out that, on certain industrial operations, the man-hours required to produce a unit of product decrease as the learning process takes place. I should like to add some additional information on the effect of learning on costs, availed of to aid a company in pricing its finished product and in purchasing material or components. This letter will deal with the effect of the learning function on various costs including labor, material and overhead and also on the proper handling of these costs in making learning curve calculations. For the technical aspects of learning curves and the computations necessary for their use the reader is referred to the article mentioned above.

In many situations, it can be demonstrated empirically that the learning phenomenon influences direct labor costs. If we can assume that direct labor hours per unit of product decrease as the learning process takes place, then we can say that, because direct labor cost per unit *usually* varies proportionately with direct labor hours per unit, the direct labor cost per unit is partly a function of the learning curve. The word *usually* is italicized because the direct labor cost per unit does not always vary with the learning process as, for example, where piece rates or other incentive plans are in effect and remain unchanged. Even though the use of an incentive wage plan may invalidate the use of the learning function in relation to the direct labor cost per unit, the learning function is still an important consideration regarding overhead and selling and administrative costs.

For direct material costs, the learning function usually cannot be applied unless scrap is substantially reduced. The procedure for handling the learning curve calcu-

lations for cost items not subject to the learning curve, such as raw material, is to deduct these items from the total per unit cost figure prior to making any computations using the learning curve. When the new figure for the cost elements subject to the learning curve is calculated, the fixed per unit cost elements (i.e., direct material cost per unit), previously subtracted, are added back in to arrive at a total cost figure.

Many manufacturing overhead costs are subject to the learning function. For instance, manufacturing overhead costs such as supervision, maintenance, property taxes, rent and various service department costs do not fluctuate in total amount with volume. As a result, if the number of units of output increases due to the learning function, the fixed amount of overhead applied to each unit of output should be less. Because the relatively fixed amount of overhead is spread over more units, the learning function and learning curve calculations can be applied to certain manufacturing overhead costs. There are, however, certain manufacturing overhead costs such as tooling, packing, and shipping costs that do not vary with direct labor hours and, therefore, are not subject to the learning curve. The per unit costs of these fixed per unit charges should be treated the same as direct material costs mentioned above, that is, they should be subtracted from the total per unit cost of the product before any calculations are made with the other costs which are subject to the learning process.

The concept of the learning process is related to selling and administrative costs in the same way as it is related to manufacturing overhead costs. Many selling and administrative costs, such as credit department and typing pool costs and executives' salaries, actually vary per unit of output in relation to direct labor hours. As a result, all selling and administrative costs can often be assumed to be subject to the learning curve although the reasoning is fallacious to some extent, *viz.*, the selling time and along with it the selling cost to get and follow through on a specific sales contract would not necessarily vary directly with the man-hours required for manufacturing the product.

In summary, the learning process has an important effect on costs in many manufacturing operations. As the man-hours required to complete a job decrease or, in other words, as the number of units produced in a given amount of time increase, the direct labor costs (if hourly wages are paid) and much of the overhead are spread over more units, thus lowering total per unit costs. When thinking in terms of the the learning curve effect on costs, one should think not only of the decrease in labor costs per unit, but also of the effect on many overhead costs, which are often substantial.

PETER B. LAUBACH, *Boston Chapter*

Notes on Current Reading

Books and Studies

How to Make Sales Estimates More Accurate

Research Institute of America, 292 Madison Avenue, New York 17, N. Y. Paper Bound, 1954, 28 pp. $4.00 to members, $20 to non-members.

This compact study has the practical ring of well-digested material. It contains charts and tables illustrative of effective compilations and analyses relating to useful sales forecasting. It also contains cautions and observations in text. It is organized about eleven considerations considered useful pretty much in the order treated. The first is "teamwork" and the last "economic yardsticks to improve your forecast."

Modern Business Law

A. Lincoln Lavine, Prentice-Hall, Inc., 70 Fifth Avenue, New York 11, N. Y., 1954, 970 pp. $9.00.

The word, "modern" in the title of the volume is explained as relating to an "economy adjusting itself to a new world." The topics of contracts, negotiable instruments, sales, bailments, partnerships, corporations, business regulation, real and personal property, and debtor and creditor, are among those treated. The needs of the accountant for familiarity with commercial law are kept in mind.

Profit Sharing Patterns

P. A. Knowlton, Profit Sharing Research Foundation, 1322 Chicago Avenue, Evanston, Ill., 1954, 144 pp., $10.50.

Assembled here is a great deal of data on existing profit sharing plans, origin, types, geographical and industry dispersion etc., etc. One section of the study analyzes the "motive for plan installation and correlates the degree of success . . . to plan objectives, to plan types, and to variations in the usual provisions. Successive closing "parts" of the publication individualize 300 "rank-and-file" plans and "twenty plans for less-than-majority groups."

Industrial Pensions

Charles L. Dearing, The Brookings Institution, 722 Jackson Place, N.W., Washington 6, D. C., 1954, 310 pp., $3.75.

A broad study—it starts with consideration of "Problems of an Aging Population" the present work deals with practical as well as background problems in chapters on "Structure and Operation of Pension Plans," "Estimated Present and Probable Coverage," "Amount and Nature of Industrial Pension Contributions," etc. Appendix C presents information on "Tax Aspects of Industrial Pensions." Appendix A describes the way in which the data availed of in the study was assembled.

The Department Store—Its Origins, Evolution and Economics

H. Pasdermadjian, Newman Books, London, England, 1954, 216 pp.

Not an accounting book but an historical study of the development of a type of business known only to the modern day, this volume is both readable and informative. In Section IV, "Department Store Economies" and Section VI, "The Future of the Department Store" appear the outlines of the management problems to the solution of which the process of accounting can provide at least directional assistance.

SELECTED ARTICLES FROM ACCOUNTING PERIODICALS

CANADIAN CHARTERED ACCOUNTANT, September 1954 (10 Adelaide St. E., Toronto, Ontario, Canada, single copy $.50)
- The Accountant in Modern Society. Ian T. Morrow
- *Integration of Cost Accounting and Financial Accounting Concepts. A. S. Donnelly

THE COST ACCOUNTANT, September 1954 (63 Portland Place, London W1, England)
- The Contribution of Marginal Costing to Present-Day Problems. W. E. Harrison.

COST AND MANAGEMENT, September 1954 (66 King St. E., Hamilton, Ontario, Canada, single copy $.50)
- Profit Assurance Through Cost Reduction. Anthony A. Kasper
- Management Planning and Control Through Budgets. R. D. Richardson
- Developing the Handbook for Accounting Supervision. Franklyn Lambert

THE INTERNAL AUDITOR, September 1954 (120 Wall Street, New York 5, N. Y., single copy $1.00)
- *Budgeting. E. K. Higley
- Internal Auditing—A Managerial Device. A Symposium
- Auditing Capital Outlays. M. B. T. Davies
- *Inventory Verification. R. F. Czinger

JOURNAL OF ACCOUNTANCY, October 1954 (270 Madison Avenue, New York 16, N. Y., single copy $.75)
- *A Practical Cost System for a Small Manufacturer. James A. Mitchell

NEW YORK CERTIFIED PUBLIC ACCOUNTANT, September 1954 (677 Fifth Avenue, New York 22, N. Y., single copy $.50)
- Accounting Procedures for Monthly Investment Plan Accounts. John J. McNeary

SELECTED ARTICLES FROM BUSINESS PERIODICALS

ADVANCED MANAGEMENT, September 1954 (74 Fifth Avenue, New York 11, N. Y., single copy $.75 to members, $1.00 to nonmembers)
- Good Management Men Delegate Authority. John H. Gorsuch
- Dangers of Management Specialization Today. Philip B. Hofmann

AMERICAN BUSINESS, September 1954 (4660 Ravenwood Avenue, Chicago 40, Ill., single copy $.35)
- How Jewel Tea Keeps Cost Down. Marilyn French
- Westinghouse's Work Simplification Saves. Wells Norris
- Measuring Clerical Work. Edwin T. Ashman
- What Profit-Sharing Program Does for Signode Steel. Phil Hirsch

CREDIT AND FINANCIAL MANAGEMENT, September 1954 (33 South Clark St., Chicago 3, Ill., single copy $.25)
- Cash Forecast and Collection Budget Put Credit Management on Its Toes. L. W. Stolte

DUN'S REVIEW AND MODERN INDUSTRY, September 1954 (99 Church Street, N. Y., N. Y., single copy $.75)
- What's Wrong With Office Management. James K. Blake (Editor)

HARVARD BUSINESS REVIEW, Sept.-Oct. 1954 (Soldiers Field Station, Boston 63, Mass., single copy $1.50)
- Breakeven Point Control for Higher Profits. Fred V. Gardner
- *The New Science of Records Management, Schiff and Barcan

JOURNAL OF MARKETING, October 1954 (1525 East 53rd St., Chicago 15, Ill.)
- Fundamental Differences Between Industrial and Consumer Marketing. Industrial Marketing Committee Review Board

* Further mentioned in accompanying notes on particular articles.

Integration of Cost Accounting and Financial Accounting Concepts

A. S. Donnelly. The Canadian Chartered Accountant, September 1954.

It is stated in this paper that integration is a fundamental approach or a philosophy rather than an application of a particular system. Integration of cost accounting and financial accounting concepts is presented as something which should interest every accountant—not merely those who are in the accounting or cost accounting sections of commercial or industrial concerns.

A Practical Cost System for a Small Manufacturer

James A. Mitchell, Journal of Accountancy, October 1954.

The present article states that "the essence of the system (described) is the determination of prime cost by application of a predetermined percentage to the total cost of all materials used in the product." The paper is offered as disclosing "how one man can handle a million-dollar volume, compute costs with reasonable accuracy in advance of manufacture and make a monthly check on profit and loss figures."

Budgeting

E. K. Higley, Internal Auditor, September 1954.

Presenting the budget director and the internal auditor, with their differing responsibilities, as somewhat central to the success of a budget, the greater emphasis of this presentation by the controller of a public utility is on teamwork by management personnel. Budgeting prerequisites, advantages, and procedure are dealt with.

Inventory Verification

Raymond F. Czinger, The Internal Auditor, September 1594.

Described in this paper are the underlying factors contributing (or not) to satisfactory stock records and useful physical counts. The background is that of an electric public utility in which stores of supplies are the formidable item. The article is written in a general vein, as applicable to industrial companies also. It is suggested the stockroom procedure as a whole be reviewed.

The New Science of Records Management

Robert A. Shiff and Arthur Barcan, Harvard Business Review, Sept.-Oct., 1954.

The authors of this article are of the opinion that records management has come of age as a practical science designed to help industry and government, and that it is demonstrating capacity to improve paperwork operations through applied standards of quantity, cost, and quality. They suggest that alert administrators will want to investigate the potentialities, each for his own organization.

For Your Information

LAST YEAR'S INVENTORY EXPERIENCE OF 48 CONNECTICUT MANUFACTURERS

We are indebted to New Haven Chapter of N.A.C.A. for the limited survey in its own area which produced the data as to 1953 inventories reflected in the table over the page. In the presentation of the data, it is not intended here—and was not intended by its compilers—to reflect practice on any broader basis than the representation of how less than half a hundred particular companies in one section of the country responded to the inquiries indicated. It is, thus, simply one more bit of information—fact as far as it goes. The committee of New Haven chapter which carried out the survey and reported on it was headed by W. B. Williams, chairman, and included as co-members, E. M. Kania and A. R. Oakes.

In the report of the survey, several points are made in text. Among these is a summary of respondents' reasons for taking inventory earlier than the closing day of the year, when that was the case. The comment follows:

"The most common reason for taking inventory prior to close of the fiscal period was to allow time for pricing and computing inventory value before closing the books. One company found it necessary to inventory early because large stocks of material are stored outdoors and bad weather at the year-end makes an accurate count or measurement improbable."

In detailing to some extent sundry causes of inventory adjustment, the report of survey notes the following:

"A number of reporting companies attributed differences to a combination of causes and among the 'other' reasons given were:

1. Policy of costing safe.
2. Variations in product produced.
3. Activity of material involved.
4. Difficulty of measuring usage of some piped acids.
5. Estimated bills of material.
6. Overstatement of production paid at incentive.
7. Difference between estimated cost and cost or market.
8. Transposition of code numbers."

The report closes with the following mention of exceptional methods revealed by company replies:

"One company which takes inventory monthly uses a mark-sense tabulating card for recording, at the source, the count, location, and coded description. These are then collated with cards which have been prepunched with description code and cost.

"Another company segregates obsolete or inactive stock in a separate stockroom, so as to eliminate repetitious counting each year. A permanent obsolete tag is attached to each item. If the item is later used, the tag is sent to the accounting department so that an appropriate entry may be made to 'pick up' the value.

"Still another company teams shop and clerical personnel for making the physical count. Order department personnel are assigned to count finished parts and engineering department personnel are assigned to count technical items, so as to familiarize these people with what is available in stock, with the secondary objective of lessening stock obsolescence."

READINGS ON RECORDS MANAGEMENT

The word "management" has come to be the dignifying surname for every skilled

1953 INVENTORY PRACTICES OF 48 COMPANIES

Characteristics of Sample

1. Manufacturing companies in New Haven Chapter area.
2. Size by dollar volume of assets: Less than $250,000 2, $250,000 to $10,000 4, Over $10,000,000 5.
3. Size by number of employees: Less than 50 3, 50 to 1,000 37, Over 1,000 8.
4. Industry type: Metal and machinery companies 24, Rubber products 4, Textile and paper 7, Rugs, etc. 2, Electrical, etc. 7, Misc. 4.

Background Practices Relating to Inventory

1. Frequency of physical inventories: Monthly* 6, Quarterly 1, Semiannually 9, Annually 32. (*Production not suspended in 5 cases).
2. Perpetual inventory maintained: Entire inventory 21, Part 25, None 1, No reply 1.
3. *If serial counts are made to perpetual, do they substitute for physical? 7, Supplement physical? 29. (*Many companies did not indicate.)

Physical Inventory for Balance Sheet Purposes

1. When taken? End of fiscal year 35, Shortly before 12, Other time 1.
   (8 companies take inventory at low-stock point; 14 try to effect this.)
2. Inclusiveness: All departments 42, Less complete 4, No response 2.
   (12 companies include office supplies; 29 maintenance supplies and 33 production supplies. Some of these inventory issued supplies).
3. Intensity: All items actually counted, weighed or measured at inventory 40.
   Some tests* 8. (*To substantiate stock records.)
4. Responsibility for physical inventory: Accounting Dept. 25, Plant 21, Other 2.
5. Effect on production: Suspended* 29, In some departments* 2, Not suspended 17.
   (*Not over a day 9, two days 10, three days 9; none over 5 days).
6. Primary count record tag 7, Two-part tag 19, Sheet 23, Tab card 4, Other* 3
   (*One a keysort card; another a triplicate tag).
7. Making count: accounting department 3, Individual departments 32, Combination 9, Other 4.
8. Re-check of count: In entirety 12, By test 33, Not at all 3.
   (Done in the main by a second team or accounting personnel).
9. Pricing of inventory:

	Raw material	In process	Finished	Supplies
Actual cost	17	11	15	18
Standard cost	4	15	13	1
Cost or market	21	13	17	15
@Lifo"	3	1	1	-
Other	1	1	3	1
Not disclosed	1	7	2	13
Total	48	48	48	48

10. Adjustment of inventories. Under 2% of value 27, 2% to 5% 14, 5% to 10% 6, Not given 1. Principal causes*: To cost or market-from actual 11, From standard 6, Clerical errors 27, Unreported scrap 12, Other 10, Unknown 15.
    (*More than one cause given in large proportion of replies.)

or judgment-requiring activity which goes into making an enterprise run. Hence, there is a whole family of managements whose given names are Production, Sales, Accounting, Office, Research, Engineering and a host of others—not to mention Top, Middle and Operating. To this field of parents, children, brothers, sisters and cousins, well intermixed and hard to identify as immediate or remote relatives, comes also Records Management, mention of which at once establishes its valid claim to management kinship for, in a business, records are certainly involved in every activity for help or hindrance and their disposition after initial use is a moot problem. So difficult and

obtrusive is this problem that it is probably initially responsible for identification of records management as a separate function.

Once identified and thus achieving acknowledgement as an approach in viewing business, records management proves to have many aspects, well-evidenced by a recent publication of the Records Management Council (50 E. 42nd St., New York 17, N. Y.) entitled *Guide to Selected Readings in Records Management*, a 28 page (letter-size) pamphlet priced at $2.85 a copy. Perhaps between a thousand and fifteen hundred references are here given alphabetically under the twenty separate classifications listed below:

Records Management—General
Archives Administration
Business History
Correspondence Control
Disposal and Preservation of Records
Filing, Indexing and Classifying
Forms Control
Office Machines and Equipment
Office Manuals
Office Systems and Procedures
Photo-Reproduction Processes
Quality Control
Records Center Operations
Rehabilitation and Repair of Records
Reports Control
Specialized Records Systems
Testing and Training for Records Operations
Vital Records Protection
Work Standards for Offices
*Periodicals

The above listing, by the very words it uses, establishes rapport between records and management and such other business functions as office cost control and standards, work simplifications, reports, forms control, equipment mechanization and the housing and filing of active and inactive records. It is this tie-in perhaps which measures the relevance of the citations to the work of the industrial accountant.

Prefatorily the pamphlet identifies the records management field as follows:

"Record management is a new profession that has stimulated a rapidly-growing accumulation of literature. Convinced that a well-organized body of reference material is essential to the practice of a profession, the National Records Management Council has prepared this Guide to Selected Readings. It is the first comprehensive, selective listing of books, periodicals, articles, pamphlets and papers on every aspect of the subject.

"The term records management is here used in its broadest sense. It covers day-to-day operations such as correspondence, forms, systems and procedures, as well as long-range programs like archives administration and business history."

* Includes mention of *N.A.C.A. Bulletin* and other accounting and management periodicals.